

LISTA SERVICIILOR OFERITE DE MEMBRII NODULUI SI AI RETELEI DE BENEFICIARI*

*serviciile declarate de fiecare membru in parte, in functie de infrastructura si expertiza sustinuta prin cercetari avansate si studii de caz

Nr.	Denumire serviciu	Echipament / ansamblu echipamente	Exemplu reprezentativ aplicat (referință bibliografică, presă, etc.)	Destinație platformă
Institutul Național de Cercetare-Dezvoltare pentru Optoelectronică INOE 2000				
1	Caracterizari elementale si moleculare prin metode non-invazive	<ul style="list-style-type: none"> • Spectroscopie de fluorescență de raze X (XRF), Tracer III SD • Fluorescență Indusă Laser (LIF), cu extensie pentru imagistică, Laser Q-switched YAG, CryLas Q 		MOLAB, FIXLAB, ARCHLAB
2	Caracterizari elementale si moleculare prin metode micro-invazive	Spectroscopie în infraroșu cu transformată Fourier FTIR - Perkin Elmer SpectrumTwo cu accesorii (fibră optică) pentru măsurare <i>insitu</i>		FIXLAB
	Caracterizari elementale si moleculare prin metode ce necesita prelevare de probe	<ul style="list-style-type: none"> • Sistem spectroscopie de fluorescență - spectrofluorimetru FLS 920 • Spectrometru Micro-Raman-LabRAM HR UV-Visible-NIR • Sisteme de caracterizare structurală prin difracție de raze X: Rigaku SmartLab 3 si Rigaku Miniflex II 		
3	analiza elementala si stratigrafica non-contact micro-invaziva	(LIBS) Laser Induced Breakdown Spectroscopy, Laser YAG-Nd cu cameră iStar (Andor) și spectrometru Mechelle		MOLAB, FIXLAB
4	curatare laser	<ul style="list-style-type: none"> • Laser QS Nd:YAG Laser Quanta System Palladio (2 lungimi de undă) • Laser QS Nd:YAG Quanta System Raffaello (4 lungimi de undă) 		MOLAB, FIXLAB, ARHILAB
5	Analize comparative non-invazive: - documentare imagistică -vizualizare substraturi	• Echipament mobil de radiologie digitală de raze x, ISOVOLT Mobile 160		ARHILAB, FIXLAB, MOLAB

	-caracterizarea structurii materialului -starea de conservare a substraturilor	<ul style="list-style-type: none"> • Senzor hiperspectral, HYSpex SWIR 384 • Cameră multispectrală ARTIST 		
	Termografie si determinarea emisivitatii	Camera termică FLIR		MOLAB, FIXLAB
6	Modele digitale complexe 2D si 3D pentru investigarea si caracterizarea imagistica si structurala a suprafetelor multistrat	<ul style="list-style-type: none"> • Scanare laser 3 D, Surphaser® Hemispherical HS25 si NextEngine • Vibrometru Laser Doppler (LDV), Polytec PSV-500 • Sistem fotogrametrie: aparat foto DSLR Nikon D80, 2 Unități de procesare date; program software dedicat AGISOFT PhotoScan, • Colorimetriu portabil: COLOR EYE-XTH • Imprimante 3D (modele): Z printer si 3D Kreator Motion 		DIGILAB, ARHILAB MOLAB
7	Documentare aeriana pentru situri arheologice, zone urbane sau monumente de amploare	<p>Vehicul aerian fără pilot la bord (UAV) ITALDRON E-Epic 8 HSEMax, echipată cu senzori:</p> <ul style="list-style-type: none"> • cameră termică-OPTRIS • -LIDAR-YellowScan • -cameră multispectrală-Tetracam • -cameră foto: Sony Alpha, Niko D80 		ARHILAB
8	Maparea siturilor arheologice	Radar cu penetrare în sol (GPR), Mala X3M		ARHILAB
9	monitorizare de microclimat	<ul style="list-style-type: none"> • Sistem de senzori inteligenti, • Senzori pentru măsurarea temperaturii (T) și a umidității relative (RH) Lascar Electronics • Stație meteo - Oregon Scientific Weather Station 		MOBILAB, FIXLAB
10	Decontaminarea obiectelor prin anoxie	Veloxi 1000		MOBILAB, FIXLAB

11	caracterizarea suprafetelor prin prin microscopie de fluorescena	Microscop Leica M205FA		FIXLAB
	caracterizarea suprafetelor prin microscopie digitala portabila	Scalar DG 3		MOLAB, FIXLAB
	Caracterizarea suprafetelor si stratigrafie	Sistem tomografie în coerență optică (OCT) - OCP930SR - Standard SR-OCT with Handheld Probe, 930nm		
	- caracterizare morfo-structurală și compozitională	Microscopie de electroni Auger, NanoSAM LAB S (OMICRON – OXFORD Instruments		
	caracterizarea suprafetelor si analiza elementala	Microscop electronic de baleiaj cu modul de determinare elementală prin spectroscopie dispersivă cu raze X (SEM-EDX) - TM 3030 Plus		
12	imbatranire accelerata	camera microclimat BINDER KMF, lampi UVA, UVB, UVC		FIXLAB
13	Documentarea siturilor arheologice subacvatice	submersibile underwater drone		ARHILAB
14	analize microbiologice			FIXLAB
Institutul Național al Patrimoniului INP				
1	Arhiva istorică a Comisiunii Monumentelor Istorice și a Direcției Monumentelor Istorice (acces pentru specialiști)	Arhivă analogică, fototecă și filmotecă	https://horia-teodoru.ro/ http://trajanescu.ro/ http://www.stefan-bals.ro/	Archilab
2	Arhiva istorică a inventarului patrimoniului imobil și mobil (ante 1989)	Arhivă analogică	-	Archilab
3	ProEuropeana. Biblioteca digitală a publicațiilor culturale (acces liber online)	Biblioteca digitală de specialitate	http://cimec.ro/Biblioteca-Digitala/Biblioteca.html ; http://biblioteca-digitala.ro	Digilab
4	Repertoriul Arheologic Național (acces liber online)	Bază de date	http://ran.cimec.ro/	Digilab
5	Cronica cercetărilor arheologice din România (acces liber online)	Bază de date	http://cronica.cimec.ro/	Digilab

6	Aplicația on-line GIS pentru evidența spațială a patrimoniului cultural (acces liber online)	Server cartografic pentru patrimoniul cultural național	http://map.cimec.ro/Mapserver/	Digilab
7	Muzee și colecții din România (acces liber online)	Bază de date	http://ghidulmuzeelor.cimec.ro/	Digilab
8	Bunuri culturale mobile clasate în Patrimoniul Cultural Național (acces liber online)	Bază de date	http://clasate.cimec.ro/	Digilab
9	ETNOMON - Muzeul virtual al monumentelor etnografice din muzeele în aer liber din România (acces liber online)	Bază de date	http://monumente-etnografice.cimec.ro/aeretrn.htm	Digilab

Institutul National pentru Fizica si Inginerie Nucleara "Horia Hulubei" IFIN HH

1.	Analize compositionale in-situ pentru artefacte arheologice din aur si argint	Spectrometru portabil XRF X-MET 3000 TXR+ Oxford Instruments Spectrometru portabil XRF TRACER 5' BRUKER	The Sarmizegetusa Bracelets, Bogdan Constantinescu, Ernest Oberländer-Târnoveanu, Roxana Bugoi, Viorel Cojocaru, Martin Radtke - Antiquity Journal , London, Volume 84 , Issue 326 (2010) 1028-1042 Studies on archaeological gold items found in Romanian territory using X-Ray-based analytical spectrometry - B. Constantinescu, A. Vasilescu, D. Stan, M.Radtke, G. Buzanich, D. Ceccato, U. Reinholz, E. Oberlaender-Târnoveanu, Journal of Analytical Atomic Spectrometry , Vol. 27 . No. 12, pp. 2076-2081 (2012)	MOLAB
2.	Datate cu radiocarbon (¹⁴ C) prin metoda AMS	RoAMS - Laborator acreditat international, constand din: * Spectrometru de masa cu accelerator de particule de tip 1 MV Tandetron HVE; Sensibilitate 0.5*10 ⁻¹⁵ , echivalent cca. 50-60.000 ani vechime *laborator de preparare a probelor de oase, lemn, seminte, scoici, corali, sedimente, textile, mortare, apa	Parures et objets d'art du Gravettien recent de Poiana Cires,ului-Piatra Neamt, (Roumanie) – Marian Cârciumar, Elena Niță, Nejma Goutas, Marcel Otte, Ovidiu Cîrstina, Tiberiu Sava, Mihai Straticiu, Maria Mihaela Manea, L'anthropologie , 2677, 2018 New radiocarbon dates for Middle Bronze Age Transylvania (c. 1900-1450 cal BC) and their relevance for contacts with the Aegean - Mihai Rotea, Nona Palincaș, Tiberiu Sava, Gabriela Sava, Oana Gâza) 5th Balkan Symposium of Archeometry , Sinaia, Romania, 25th - 29th September 2016 – <i>Proceedings</i> , in preparation pentru editura Archaeopress, Oxford, UK	FIXLAB
3.	Determinarea compoziției elementale cu fascicule de ioni accelerați	Accelerator de particule de tip Tandetron™ de 3 MV, prevăzut cu sistem de analiză și poziționare al probelor dedicat pentru obiectele de patrimoniu - Măsurări în vid (10 ⁻⁶ mbar) cu microfascicul, pentru probe cu dimensiuni sub 35 mm x10 mm x 3 mm; - Măsurători cu fascicul extern în atmosferă de He, independente de geometria probei	Complex archaeometallurgical investigation of silver coins from the XVIth-XVIIIth century R. C. Fierascu, Irina Fierascu, Alina Ortana, Florin Constantin, Dragos Alexandru Mirea, Mihai Statescu Nucl Instrum Methods Phys Res B 401 (2017) 18-24 2017 Archaeological and archaeometrical analyses on Eneolithic pottery from Nanov-Vistireasa (Teleorman County) V. Opris et al.	FIXLAB

		- Pot fi detectate elementele chimice cu $Z = 3 - 92$, iar limita de detecție variază de la sute de ppm la mii de ppm în funcție de numărul atomic al elementului chimic	5th Balkan Symposium of Archeometry , Sinaia, Romania, 25th - 29th September 2016 – <i>Proceedings</i> , in preparation pentru editura Archaeopress, Oxford, UK	
4	Tomografie cu raze X pe artefacte de lut, ceramica, sticla, os metal	Tomograf X T H 225	An X-ray tomograph based on a flat panel detector Constantin, F.; Pavel, C.; Bugoi, R.; et al. NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A - ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT Volume: 621 Issue: 1-3 Pages: 685-689 SEP 2010	FIXLAB
5.	Tratament cu radiatii ionizante in scopul dezinfectiei obiectelor de patrimoniu cultural	Iradiator gamma model SVST Co-60/B, Laborator de dozimetrie de doze mari si de incercari fizico-chimice / iradiator gamma de cercetare GC-5000, spectroscopie vibrationala, cromatografie de gaze/spectroscopie de masa, analiza termica, incercari mecanice, culoare, rezonanta electronica de spin.	Nuclear Science Preserves Art, IAEA (2011) https://www.youtube.com/watch?v=LKtxusga8UU <i>IAEA Impact: Protecting Romania's Cultural Heritage Using Nuclear Technology</i> , Aabha Dixit, IAEA Office of Public Information and Communication (2015) https://www.iaea.org/newscenter/news/iaea-impact-protecting-romania-s-cultural-heritage-using-nuclear-technology Emergency Intervention at a Parish Church in Romania, C. C. Ponta, in <i>Uses of Ionizing Radiation for Tangible Cultural Heritage Conservation, IAEA RADIATION TECHNOLOGY SERIES Nr. 6</i> , STI/PUB/1747 (2017), 141-147 ISBN 978-92-0-103316-1 Preservation of Cultural Heritage, Bogdan Constantinescu, Valentin Moise in <i>Nuclear physics for cultural heritage, A Topical Review by the Nuclear Physics Division of the European Physical Society</i> , (Edited by: Anna Macková, Douglas MacGregor, Faïçal Azaiez, Johan Nyberg, and Eli Piassetzky), EDP Sciences (2016) 54-58 ISBN 978-2-7598-2091-7	FIXLAB
6.	Analize de spectroscopie vibrationala (FT-IR, FT-RAMAN) si spectrometrie de masa (GC/MS, ICP/MS) pentru caracterizarea obiectelor de patrimoniu cultural (icoane, fresce, tablouri, etc.) Include o baza de date naționale.	Spectrometru FTIR/FTRaman clasa Vertex 70, Bruker Optics, Germania cu: - accesoriu de reflectanta difuza tip microscop Helios si accesoriu ATR (reflexie total atenuata) domeniu spectral 4000-400 cm-1; - modul Raman (RAM II) cu sondă Raman pentru analize nedistructive si fara contact, domeniu spectral Raman 3500-50 cm-1, sursa de excitare LASER NIR cu lungimea de unda 1064 nm; - accesoriu TGA-IR pentru analiza online a gazelor degajate din probe testate prin termogravimetrie. Gaz cromatograf (GC6890N) cuplat cu spectrometru de masa (5975 inert MSD) GC/MS Agilent, cu accesorii de injectie a probelor: termodesorbție Markes clasa Unity; headspace Agilent clasa 7697A.	A comparative study of two icons representing the “Coronation of the Virgin by the Holy Trinity”: Walachia, 18th century and Transylvania, 19th century Dorina Claudia Samoilescu, Octavian G. Dului, Maria M. Manea, Daniela Stan, Bogdan Constantinescu, Journal of Cultural Heritage 27 (2017) 175–180 Thermal Desorption/Gas Chromatography/Mass Spectrometry Approach for Characterization of the Volatile Fraction from Amber Specimens: a Possibility of Tracking Geological Origins, Marian Virgolici, Corneliu Ponta, Mihaela Manea, Daniel Negut, Mihalis Cutrubinis, Ioan Moise, Rares Suvaila, Eugen Teodor, Costel Sarbu and Andrei Medvedovici, Journal of Chromatography A , Volume 1217 , 1977-1987 (2010).	FIXLAB

		Spectrometru de masa cu plasma cuplata inductiv ICP/MS Agilent clasa 7700s cu analizor de masa tip simplu cuadropol si celula de coliziune tip ORS. Spectrometru de masa de inalta rezolutie tip HR/ICP/MS cu analizor de masa tip sector magnetic, Thermo clasa Element XR		
7.	Analize microbiologice de caracterizare a contaminarii microbiene si a radiorezistentei acesteia, pentru obiecte si colectii de patrimoniu cultural	Laborator de microbiologie / sistem PCR, analizor BIOLOG, cititor microplaci - absorbanta/ fluorescenta/ luminiscenta, microscop optic.	Radioresistance of biodegradation fungi and its importance in establishing the decontamination dose, L.Trandafir, F. L. Zorila, M. Alexandru, M. Ene, M. Constantin, A. Alistar, O. Iordache, I. Stanculescu, Proceedings of the 5th International Conference on Advanced Materials and Systems (2014) 561-566 Radiation processing for cultural heritage preservation – Romanian experience, Ioan Valentin Moise, Mihaela Ene, Constantin Daniel Negut, Mihalis Cutrubinis, Maria Mihaela Manea, NUKLEONIKA 2017; 62(4):253-260	FIXLAB

Universitatea de Artă și Design Cluj-Napoca UAD

1.	Microscopie FT-IR și imagistică chimică; inspecție vizibilă și analiză spectrală infra-roșu a oricărui eșantion.	Microscop FT-IR HYPERION 1000/2000 BRUKER	-	Fixlab
2.	Investigarea materialelor constitutive; o mare varietate de utilizări: știința materialelor, artă, patrimoniu cultural, chimie, mineralogie, biologie, etc.	Microscop RAMAN SENTERRA - BRUKER	-	Fixlab
3.	Spectrometrie FTIR. VERTEX 70, din seria Vertex Bruker este un Spectrometru FT-IR de înaltă performanță pentru analize exigente și aplicații R&D.	spectrometru FTIR -VERTEX 70/70v	-	Fixlab
4	Reflectografie IR; Investigarea operelor de artă.	Sistem pentru reflectografie Micro IR20	-	Molab

Institutul National Cercetare-Dezvoltare pentru Textile si Pielarie INCDTP

1.	<p>Analytical database of the CLEAR diagnostic system for modern, artificially aged, historical and archeological leather and parchment artifacts</p>	<p>The database contains analytical information regarding all structural levels of collagen:</p> <ul style="list-style-type: none"> -macroscopic – information regarding the animal species and the macroscopic deterioration state -microscopic – shrinkage activity determined by MHT method; -mezoscopic – analytical data collected by thermal and calorimetry analysis methods (TG-DTG, DSC, microDSC and DMA) -molecular – analytical data collected by FTIR-ATR spectroscopy <p>The CLEAR database was created in the COLLAGE PN II 224/2012 project and complemented with results obtained in COLLAGE and InHerit PN II 325/2014 projects, in bilateral projects PN II 549/2012; 671/2013; 713/2013; RO13MO10/2013 and in European projects ADAS, E!5837; CIPE-2004-D39. Data from ongoing projects (KOLLART-PN III PED 168/2017, PROART-PN III PED 162/2017, SUSPLART- EUREKA E! 9 975, InSuLa-Manunet 35/2018) will be added as they are collected.</p>	<p>Study of manufacturing techniques used in different geographical areas, in different historical periods.</p> <ul style="list-style-type: none"> • E. Badea, C. Carsote, <i>I segreti della pergamena del testamento di Marco Polo/The secrets of the parchment containing Marco Polo's will</i>. In “<i>Ego Marcus Paulo volo et ordino. I segreti del Testamento di Marco Polo</i>”, Ed. Tiziana Plebani, Scrinium, Venice, Italy, 2017, p. 246-271. ISBN: 978-88-96364-04-8 • E. Badea, C. Carsote, I. Petroviciu, L. Miu, A. Vitale Brovarone, G. Della Gatta, <i>Archival and library parchments across West and East Europe: evenness and oddities</i>, RESTITUTIO – Buletin de conservare-restaurare, no. 9, 2015, Bucharest, p. 46-53. ISSN: 2065-2992. <p>Study of the effects of conservation conditions: storage, handling, exposure, etc.</p> <ul style="list-style-type: none"> • C. Carsote, E. Badea, I. Petroviciu, L. Miu, <i>Material substrate of documents. On craftsmanship and knowledge</i>. In “<i>Parchment...a story. The unseen face of parchment documents issued by the Chancellery of Stephen the Great (in Romanian)</i>”. Coord.: G. Dumitrescu and E. Badea, Excelenta prin Cultura Press, Bucharest 2015, p. 37-55. ISBN: 978-606-93840-1-5 • P. Budrugaec, C. Carsote, L. Miu, <i>Application of thermal analysis methods for damage assessment of leather in an old military coat belonging to History Museum of Braşov – Romania</i>, J.Therm. Anal.Cal., 127, 765-762 (2014). • V. Plavan, M. Giurginca, P. Budrugaec, M. Vilsan, L. Miu, <i>Evaluation of the physico-chemical characteristics of leather samples of some historical objects from Kiev</i>, Rev. Chim. 61 (7), 603-605 (2010). • C. Carşote, P. Budrugaec, R. Decheva, N.S. Haralampiev, L. Miu, E. Badea, <i>Characterization of a byzantine manuscript by infrared spectroscopy and thermal analysis</i>, Rev. Rou. Chim, 59(6-7) 429-436 (2014). <p>Study of conservation and/or restoration treatment effects.</p> <ul style="list-style-type: none"> • E. Badea, L. Miu, C. Carsote, I. Petroviciu, R. Granziero, S. Perona, V. Cacchia, B. Pittari, C. Laurora, G. Della Gatta, A. Cucos, P. Budrugaec, A. Vitale Brovarone, <i>Validazione di interventi di recupero conservativo di manufatti in pergamena</i>. In Lo Stato dell'Arte 12, Nardini Editore, Florence, 2014, p. 463-470. ISBN: 88-404-4451-3 - EAN: 9788840444512 • C. Şendrea, <u>L. Miu</u>, M. Crudu, E. Badea <i>The influence of new preservation products on vegetable tanned leather for heritage object restoration</i>, Leather and Footwear Journal, vol.17, nr1, p.9-16 	Archlab
2.	<p>MHT database (Micro Hot Table Method) for modern,</p>	<p>The database contains a collection of over 500 images regarding the shrinkage activity of collagen fibres in</p>	<p>Study of conservation conditions (storage, handling, exposure, etc.).</p>	Archlab

	artificially aged, historical and archeological leather and parchment artifacts	modern, artificially aged, historical and archeological collagenous materials. Data were obtained during 2005 – 2018.	<ul style="list-style-type: none"> • P. Budrugaec, A. Cucos, L. Miu, <i>Use of thermal analysis methods to assess the damage in the bookbindings of some religious books from XVIII century, stored in Romanian libraries</i>, J.Therm. Anal. Cal. 116 (1) 141-149 (2014). • E. Badea, V.P. Sommer Dorte, K. Mühlen Axelsson, G. Della Gatta, R. Larsen R. <i>Standardised methods for damage ranking in parchment: from microscopic evaluation to collagen denaturation assessment</i>, e-Preservation Science, 9, 97-109 (2012). ISSN 1854-3928, e-ISSN 1581-9280 • C. Carsote, I. Petroviciu, L. Miu, M. Giurginca, C. Chelaru, C. Petcu -<i>Scientific Investigation of Leather in a17th C. Four Gospel by FTIR and MHT</i>, EUROPEAN SYMPOSIUM ON RELIGIOUS ART, RESTORATION AND CONSERVATION, IIIRD EDITION, Iasi, Romania, 26-28 May, 2010 • L. Miu, M. Vilsan, C. Chelaru, C. Gaidau - „<i>Determining shrinkage temperature by MICRO HOT TABLE method</i>” - MATCONS International Conference, Craiova, 15.09-19.09.2009, pg. 46-47 Study of conservation and/or restoration treatment effects. • C. Sendrea, C. Carsote, M. Radu, E. Badea, L. Miu, <i>The effect of gamma irradiation on shrinkage activity of collagen in vegetable tanned leather</i>, Rev. Chim., 7, 272-277 (2017). • 	
3.	Fibre data base	Database on information regarding textile materials: - Types: natural, artificial, synthetic, special, other (metallic, polylactic); - Characteristics: chemical formula, commercial name, production method, physical-chemical characteristics (thermal, mechanical properties, humidity, structure, melting/fire point...);		Archlab
4.	Single-sided nuclear magnetic resonance (NMR) <i>Non-invasive and non-destructive analyses</i>	NMR-Mouse one-sided NMR - PM25 Kea 2 NMR spectrometer http://www.magritek.com/products/nmr-mouse/ http://www.magritek.com/products/kea/	Assessment of conservation state of materials (impact of ageing, of conservation and restoration treatments) <ul style="list-style-type: none"> • C. Sendrea, E. Badea, A. Adams, <i>Unilateral NMR and micro DSC study of artificially aged parchments</i>, Rev. Chim., 7, 272-277 (2017). • E. Badea, C. Şendrea, C. Carşote, A. Adams, B. Blümich, H. Iovu, <i>Unilateral NMR and thermal microscopy studies of vegetable tanned leather exposed to dehydrothermal treatment and light irradiation</i>, Microchem. J. 129, 158-165 (2016). • C. Sendrea, E. Badea, I. Stanculescu, L. Miu, H. Iovu, <i>Dose-dependent effects of gamma irradiation on collagen in vegetable tanned leather by mobile NMR spectroscopy</i>, Leather and Footwear Journal, 15(3), 139-150 (2015). 	Fixlab

			<ul style="list-style-type: none"> E. Badea, L. Miu, P. Budrugaec, M. Giurginca, A. Mašić, N. Badea, G. Della Gatta, <i>Study of deterioration of historical parchments by various thermal analysis techniques, complemented by SEM, FTIR, UV-VIS-NIR and unilateral NMR investigations</i>, J. Therm. Anal. Calorim. 91, 17-27 (2008). <p>Stratigraphic analysis</p> <ul style="list-style-type: none"> N. Proietti, D. Capitani, V. Di Tullio, <i>Nuclear Magnetic Resonance, a Powerful Tool in Cultural Heritage</i>, Magnetochemistry 4, 11 (2018). V. Di Tullio, D. Capitani, A. Atrei, F. Benetti, G. Perra, F. Presciutti, N. Proietti, N. Marchettini, <i>Advanced NMR methodologies and micro-analytical techniques to investigate the stratigraphy and materials of 14th century Sienese wooden paintings</i>, Microchem. J. 125, 208-218 (2016). 	
5.	<p>Optical and scanning electron microscopy [SEM] and energy-dispersive X-ray spectroscopy [EDX] Non-destructive analyses</p>	<p>Optical microscopes (Olympus BX43 direct microscope, Olympus SZ61 stereomicroscope, Axio Imager 2 microscope - Carl Zeiss, Axiovert 40 CFL inverted microscope - Carl Zeiss, Discovery V8 stereomicroscope - Carl Zeiss). Scanning electron microscope (Quanta 200, FEI, Netherlands) coupled with energy-dispersive X-ray spectrometer to identify the elemental composition of compounds for the treatment of textile materials. This equipment is used to morphologically characterize the surface of textile materials, both longitudinally and in cross-section. It has the ability to perform micrometric imaging, through the detection of secondary electrons and backscattering electrons, which allows to study the surface morphology of materials both superficially, and in depth. The microscope is also equipped with a nitrogen purge system for its work chamber. Morphological investigation is useful in identifying the types of fibres and in assessing their degradation state by identifying existing structural defects. ERRIS link: https://erris.gov.ro/Physical-textile-analysis</p>	<p>Assessment of conservation state of materials (impact of ageing, of conservation and restoration treatments)</p> <ul style="list-style-type: none"> E. Badea, L. Miu, P. Budrugaec, M. Giurginca, A. Mašić, N. Badea, G. Della Gatta, <i>Study of deterioration of historical parchments by various thermal analysis techniques, complemented by SEM, FTIR, UV-VIS-NIR and unilateral NMR investigations</i>, J. Therm. Anal. Calorim. 91, 17-27 (2008). G. Della Gatta, E. Badea, R. Ceccarelli, T. Usacheva, A. Mašić, <i>Assessment of damage in old parchment by DSC and SEM</i>, J. Therm. Anal. Cal. 82, 637-649 (2005). 	Fixlab
6.	<p>Micro DSC and DSC Micro-destructive analyses</p>	<p>Micro DSC III Setram http://www.thermalcal.com/documents/pdfs/s3.pdf</p> <p>- differential scanning calorimeter (DSC- PYRIS Diamond, Perkin Elmer, USA), STA- 6000 (simultaneous analysis of mass and heat loss, Perkin Elmer, USA)</p>	<p>Characterization and qualitative and quantitative assessment of the degradation state of collagenous and keratin materials</p> <ul style="list-style-type: none"> E. Badea, T. Usacheva, G. Della Gatta, <i>The use of differential scanning calorimetry to characterise collagen deterioration in parchment</i>, Rossiiskii Khimicheskii Zhurnal - Zhurnal Rossiiskogo Khimicheskogo Obshchestva im. D.I. Mendeleeva (Russian Chemistry Journal), V. 59 (1), 28-41 (2015). 	Fixlab

		<p>- ApolloXenon Arc Light and Weather Fastness Tester 700; Xenotest Original Hanau; Ultra Scan Pro Hunterlab): equipment to determine dye fastness to artificial light and ageing</p> <p>- QUV, Q-lab, USA: equipment for simulation of material exposure to solar radiation with the irradiation spectrum from 200 to 800nm for accelerated ageing, simulation and control of relative humidity, of acid rain</p>	<ul style="list-style-type: none"> • E. Badea, G. Della Gatta, P. Budrugaec, <i>Characterisation and evaluation of the environmental impact on historical parchments by DSC</i>, J. Therm. Anal. Calorim., Cultural Heritage Special Chapter, invited paper, 104/2, 495-506 (2011). • M. Baias, D.E. Demco, C. Popescu, M. Möller, R. Fechete, C. Melian, B. Blümich, Thermal denaturation of hydrated wool Keratin by H-1 solid-state NMR, J. Phys. Chem. B 113(7), 2184-92 (2009). <p>Influence of manufacturing technology on the stability of collagenous materials</p> <ul style="list-style-type: none"> • C. Carşote, E. Badea, L. Miu, G. Della Gatta, <i>Study of the effect of tannins and animal species on the thermal stability of vegetable leather by differential scanning calorimetry</i>, J. Thermal. Anal. Cal. 124(3), 1255-1266 (2016). <p>Effect of ambient parameters on collagenous materials</p> <ul style="list-style-type: none"> • E. Badea, G. Della Gatta, T. Usacheva, <i>Effects of temperature and relative humidity on fibrillar collagen within parchment: a micro Differential Scanning Calorimetry (micro DSC) study</i>, Polym. Degrad. Stab., 97, 346-353 (2012). • P. Budrugaec, E. Badea, G. Della Gatta, L. Miu, A. Comănescu, <i>DSC study of deterioration caused by environmental chemical pollutants to parchment, a collagen based material</i>, Thermochim. Acta, 500, 51-62 (2010). • Raluca Maria Aileni, Dinca Laurentiu, Mancasi Iulian, Analysis of thermal behavior for a polyester fabric waterproof breathable laminated, using skin model based on sensor, UPB Scientific Bulletin, Series C: Electrical Engineering, ISSN 2286-3540 <p>Determining the ageing degree and dye fastness to light of textile materials</p> <ul style="list-style-type: none"> • Adriana Subtirica, Fazilet Taskoparan, Carmen Ghituleasa, Mariana Vamesu, Laurentiu Dinca, Investigation of color stability of naturally dyed denim garments, Conferinta internationala ICAMS (International Conference Advanced Materials and Systems), Bucuresti, Romania, 23 – 25.10.2014 • <u>Ionela Cristina Nica, Miruna Silvia Stan, Marcela Popa, Mariana Carmen Chifiriuc, Gratiela Gabriela Pircalabioru, Veronica Lazar, Iuliana Dumitrescu, Lucian Diamandescu, Marcel Feder, Mihaela Baibarac, Marin Cernea, Valentin Adrian Maraloiu, Traian Popescu and Anca Dinischiotu</u>. Development and Biocompatibility Evaluation of Photocatalytic TiO₂/Reduced Graphene Oxide-Based Nanoparticles Designed for Self-Cleaning Purposes, <i>Nanomaterials</i> 2017, <i>7</i>(9), 279; doi:10.3390/nano7090279, ISSN 2079-4991; CODEN: NANOKO) http://www.mdpi.com/2079-4991/7/9/279 	
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			<ul style="list-style-type: none"> • MS Stan, IC Nica, A Dinischiotu, E Varzaru, OG Iordache, I Dumitrescu, <u>Photocatalytic, Antimicrobial and Biocompatibility Features of Cotton Knit Coated with Fe-N-Doped Titanium Dioxide Nanoparticles</u>, Materials 9 (9), 789 • Iuliana Dumitrescu, Visileanu Emilia, Alina Popescu, Marilena Niculescu, Gheorghe Nicula, Ana Maria Mocioiu, Maria Dan, Lilioara Surdu, <u>Influenta radiatiilor ultraviolete asupra materialelor textile</u>, Editura CERTEX 2007, ISBN 978-973-171617-6; 121 pagini <p>Development of reference materials for the restoration and conservation of heritage objects from bast textile fibres</p> <ul style="list-style-type: none"> • Project: PN-II-PT-PCCA-2011-3.1-0408; Project title: "Development of advanced compatible materials and techniques and their application for the protection, conservation and restoration of cultural heritage assets", Acronym: MYTHOS • Monica Dinu, Clara Hortensia Radulescu, Gheorghe Nicula, Roxana Radvan, Ioana Maria Cortea. 2015. Characterization of contemporary bast textiles and investigation of induced ageing effects for complex Cultural Heritage restoration of textile artifacts. Industria Textila 66 (6): 353-359. ISSN 1222—5347. http://www.revistaindustriatextila.ro/images/Textila_nr_6__2015.pdf • Holger Fischer, Hortensia Clara Radulescu and Sven Wartenberg, 2016. Development of advanced compatible materials for the restoration of cultural heritage assets (Mythos): first results. Proc. Rom. Acad., Series B, 18 (1): 43-49. ISSN 1454-8267 http://www.acad.ro/sectii2002/proceedingsChemistry/doc2016-1/art06Fischer.pdf • H. Fischer, H.Wiese, C. Radulescu, P. Rödel. 2015. Development of advanced compatible materials for the restoration of cultural heritage assets (mythos): Artificial ageing of bast fibres. Vlakna a textil (Fibres and Textiles) 1: 13-16. ISSN 1335-0617. http://vat.ft.tul.cz/Archive/VaT_2015_1.pdf • Hortensia Clara Rădulescu, Roxana Radvan, Monica Simileanu, Georgeta Roșu, Adriana Ispas, Cristina Popescu, Holger Fischer, Philipp Roedel, Laura Chiriac, Gheorghe Nicula, Carmen Ghițuleasa. Preservation of the European Cultural Heritage of the historical textile artifacts from museum collections. Proceedings 15th World Textile Conference Autex 2015, June 10-12, 2015, Bucharest, Romania. ID 182, p.1-16. ISBN: 978-606-685-276-0. <p>Studies on the sources of natural dyes and ecologic dyeing technologies of textile materials using vegetable dyes</p>	
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			<ul style="list-style-type: none"> • Project: Development of an ecological dyeing process for yarn, denim fabric, jeans applicable at industrial scale based on vegetable and natural dyes - VEGDENIM • Monica Dinu, Hortensia Clara Radulescu, Gheorghe Nicula, Roxana Radvan, Ioana Maria Cortea, Characterization of contemporary bast textiles and investigation of induced ageing effects for complex Cultural Heritage restoration of textile artifacts, <i>Industria Textila</i> vol. 66, nr. 6/2015, p. 353-359. ISSN 1222—5347. 	
7.	Fourier transformed IR spectroscopy [FT-IR]-ATR <i>Non-invasive analyses</i>	In research laboratories, this type of equipment offers the possibility of analysing samples both in transmission, and in reflection, which turns it into an extremely versatile instrument which can be used to analyse almost any type of samples. It can provide valuable information in areas that vary from biology, material, textile and biomaterial processing and more. The data it provides are extremely important and can give details regarding the identity of samples depending on compound distribution in the sample.	<p>Scientific papers:</p> <ul style="list-style-type: none"> • Clara Rădulescu, Elena Perdum, Cornelia-Elena Mitran, Laurentiu CHristian Dincă, Raluca Aileni, V. Lazăr, <i>Biodeteriogenic Ability On Wool Fibres Of Some Microfungi Isolated From A Museum Environment</i>, <i>TEX-TEH VIII International Conference, Proceedings, Vol.8</i>, pp. 115, (2017) • Monica Dinu, Hortensia Clara Radulescu, Gherghe Nicula, Roxana Radvan, Ioana Maria Cortea, Characterization of contemporary bast textiles and investigation of induced ageing effects for complex Cultural Heritage restoration of textile artifacts, <i>Industria Textila</i>, vol. 66, no.6, pp.352 (2015) <p>Projects:</p> <ul style="list-style-type: none"> • Development of advanced compatible materials and techniques and their application for the protection, conservation, and restoration of cultural heritage assets (MYTHOS)- collaborative applied research project - contract no.: 228/2012 • The Romanian cultural textile heritage between tradition and conservation - PN 16 34 04 06/26014- 2016-2017. 	Fixlab
8.	Chromatography Atomic absorption	<p>-Liquid column chromatograph (HPLC/ MWD, Agilent 1100)</p> <p>-Gas chromatograph (Agilent 6890) - ECD/MS/NPD/Head space detectors</p> <p>- UV-VIS Lambda 950 spectrometer, Perkin Elmer</p> <p>This equipment is used to determine the reflection of fabric surface, in ultraviolet, visible and near infrared spectral domains, by means of the integrating sphere. Analysis can be used to compare UV-VIS-NIR reflection spectra obtained for unrestored and restored heritage fabrics. ERRIS link: https://erris.gov.ro/Toxico-ecological-Laboratory</p> <p>- Atomic absorption spectrometer (AAS 880, Varian) with flame and graphite furnace;</p> <p>The equipment is used to determine the metal content in investigated textile materials. The method used is</p>	<p>- Determination of dyes, pesticides, chemical auxiliaries, metals present on textile materials</p> <ul style="list-style-type: none"> • Iuliana Dumitrescu, Padma S. Vankar, Jyoty Srivastava, Ana Maria Mocioiu, Ovidiu George Iordache, Vopsirea bumbacului, matasii si lanii cu colorant Bixa orellana in prezenta enzimelor, <i>Industria textila</i>, 2012, vol 63, nr 6 • Iuliana Dumitrescu, Emilia Visileanu, Marilena Niculescu, Coloranti naturali obtinuti din plante si deseuri vegetale, <i>Colourage</i>, Annual 2004, pg. 121 - 129 , ISSN: 0010 – 1826 • Iuliana Dumitrescu, Maranda Erdes, Marilena Niculescu, Metode de determinare a metalelor grele pe materialele textile si din piele, <i>Industria Textila</i>, 55, nr. 3, 2004, p.161-168 • I. Dumitrescu, E. Visileanu, M.Niculescu, P.Vasile, V. Cosmin, V. Bercea, S. Manea, V. Tamas, F. Pricop - “Obtinerea colorantilor naturali din plante si deseuri vegetale”, partea I, <i>Revista Industria Textila</i>, 54, nr. 2, 2003, p. 89-96, ISSN 1222-5347 	Fixlab

		quantitative, based on spectrophotometric analysis, using air-acetylene flame or a graphite furnace, of extraction solutions prepared from characterised textiles. Determination of metal content in analysed materials may be useful in highlighting the presence or absence of natural organic or inorganic dyes containing metals in their molecular structure. ERRIS link: https://erris.gov.ro/Toxico-ecological-Laboratory	<ul style="list-style-type: none"> • Iuliana Dumitrescu, Maranda Erdes, Marilena Niculescu, Metode de determinare a metalelor grele pe materialele textile si din piele, Industria Textila, 55, nr. 3, 2004, p.161-168 	
9.	Microproduction of parchment, leather, glues, products for preventive curative conservation	<ul style="list-style-type: none"> ➤ Pilot station for manufacturing collagenous materials (parchment, vegetable leather, alum tanned leather, glacé leather, tawed leather, glues of animal origin) ➤ Micropilot station to create products for preventive conservation (cleaning, softening, hydration, antifungal / antibacterial / insecticide effect) and curative conservation (consolidation, deacidification) 	<ul style="list-style-type: none"> ➤ Patent RO 129564, <i>Parchments for restoration of heritage documents and process of developing thereof</i> ➤ Patent RO 127958, Active and preventive conservation product for treatment of heritage leather ➤ Patent RO 128752, <i>Antifungal composition for softening and conservation of leather and fur heritage objects</i> ➤ Patent RO 121430, Product for maintenance of natural heritage leather ➤ Patent RO 122098, Process for making natural leather for heritage book binding 	
10.	MHT laboratory-scale system <i>Micro-destructive analyses</i>	<ul style="list-style-type: none"> ➤ System consisting of Leica stereomicroscope and home-made thermal analysis unit ➤ System consisting of Nikon SMZ 745 stereomicroscope with camera and Linkam LTS120 heating plate 	<p>Portable ED-XRF spectrometer Micro Hot Table (MHT) Lab equipment (MHT equipment composed of a Linkam LTS120 stage equipped with a temperature controller and Linksys32 temperature control software which enables full PC programming of temperature and acquisition software) Stereomicroscope Nikon model SMZ 745; Digital, portable microscope with switchable UV/IR leds Dino Lite IDCPAD413T -I2V; Digital, portable microscope with Infrared lighting Dino Lite AM7013M-FIT; Digital, portable microscope with polariser Dino Lite AD7013MZT;</p>	Fixlab
11.	ArtCheMo Lab <i>Micro-invasive and non-invasive and/or non-destructive analyses for organic materials (leather, parchment, wood, paper, wool, silk, cotton, flax, hemp), natural and synthetic dyes, pigments, varnishes, binders, animal and vegetable glues, resins, waxes, oils, fats, etc.</i>	<ul style="list-style-type: none"> ➤ portable image MHT system (prototype) – portable Micro Hot Table analysis system ➤ Datacolor Check II Plus portable spectrometer http://www.tec-color.com/principle/product-detail/Datacolor-Check-II-8 ➤ portable NMR-Mouse one-sided NMR system - PM2 http://www.magritek.com/products/nmr-mouse/ ➤ portable Kea 2 NMR spectrometer http://www.magritek.com/products/kea/ ➤ portable ED-XRF spectrometer https://www.xglab.it/compact-portable-xrf-spectrometer-elio.shtml 	<p><u><i>In situ analyses and diagnostic</i></u> <i>Il testamento di Messer Marco Polo, viaggiatore</i>, Transdisciplinary project coordinated by The Marciana National Library of Venice and SCRINIUM Spa, Venice. Non-invasive analysis of the will of Marco Polo, of the father, Marco Polo the old, and of his uncle, Matteo Polo.</p> <ul style="list-style-type: none"> • E. Badea, C. Carsote, <i>I segreti della pergamena del testamento di Marco Polo/The secrets of the parchment containing Marco Polo's will</i>. In “<i>Ego Marcus Paulo volo et ordino. I segreti del Testamento di Marco Polo</i>”, Ed. Tiziana Plebani, Scrinium, Venice, Italy, 2017, p. 246-271. ISBN: 978-88-96364-04-8 <p>Parchment documents issued by the Chancellery of Stephen the Great from the collection of the Romanian Academy Library</p>	Molab

	<ul style="list-style-type: none"> ➤ portable FTIR ALPHA II spectrometer https://www.bruker.com/products/infrared-near-infrared-and-raman-spectroscopy/ft-ir-routine-spectrometers/alpha/overview.html ➤ portable digital microscopes <ul style="list-style-type: none"> - UV/IR -Dino Lite IDCPAD413T -I2V; - IR - Dino Lite AM7013M-FIT - Dino Lite AD7013MZT with polarized light; ➤ portable thermohygrometer for relative humidity (RH) http://www.hannainstruments.co.uk/hand-held-thermo-hygrometer-with-dew-point-measurements.html ➤ portable HI 99171 pHmeter for solids (leather, paper) 	<ul style="list-style-type: none"> • <i>Parchment...a story. The unseen face of parchment documents issued by the Chancellery of Stephen the Great (in Romanian). Coordinators: G. Dumitrescu and E. Badea, Excelenta prin Cultura Press, Bucharest 2015. ISBN 978-606-93840-1-5. eBook, Certex Press Bucharest 2015. e-ISBN 978-973-1716-62-6. Authors: G. Dumitrescu, E. Badea, L. Nastaselu, O. Dumitriu, C. Carsote, I. Petroviciu, L. Miu. Preface by A. Vitale Brovarone</i> <i>Romania-Italy bilateral project “Advanced techniques and interdisciplinary studies to evaluate historical parchment documents”, PN II 638/2013</i> <ul style="list-style-type: none"> i. <i>In situ</i> analysis of 51 Italian documents on parchment from the collections of Turin State Archives - Archivio di Stato di Torino (Abbazia di Novalesa and <i>Abbazia di Rivalta</i>). ii. <i>In situ</i> analysis of 13 Romanian parchments from the Bucharest Municipality Museum, National Museum of Romanian History, “King Ferdinand” National Military Museum, Moldavia National Museum Complex, Iasi, and “V.A. Urechia” Library, Galati. • E. Badea, C. Carsote, I. Petroviciu, L. Miu, A. Vitale Brovarone, G. Della Gatta, <i>Archival and library parchments across West and East Europe: evenness and oddities, RESTITUTIO – Buletin de conservare-restaurare</i>, no. 9, 2015, Bucuresti, p. 46-53. ISSN: 2065-2992. <i>In situ</i> analyses (monitoring) of wood and textile artifacts from the collections of outdoor ethnographic museums: “D. Gusti” National Village Museum, National Astra Museum of Sibiu and “Bucovina” Museum of Suceava, in the InHerit PN II 325 project, <i>Intelligent strategy for movable cultural heritage monitoring in changing climate</i> <i>In situ</i> analysis of alum tanned leather covers and parchment from the Rare Books collection of the Romanian Academy Library in the KOLLART project no. 168/2017. <ul style="list-style-type: none"> • Conservation sheets • Results to be published <i>In situ</i> analysis of the Four Gospels of Nicodemus of Tismana, National Museum of Romanian History (2018) <ul style="list-style-type: none"> • Results to be published <u>Articles</u> <ul style="list-style-type: none"> • C. Sendrea, E. Badea, A. Adams, Unilateral NMR and micro DSC study of artificially aged parchments, <i>Revista de Chimie</i>, 7, 272-277 (2017). • C. Carsote, C. Sendrea, I. Petroviciu, E. Badea, L. Miu, H. Iovu, <i>Primum non nocere – In situ</i> non-invasive diagnosis of historical parchment and leather Bilingual Conservation-restoration bulletin, 	
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			<p>No 9, Muzeul Satului “Dimitrie Gusti”, București (2015), p. 54-63. ISSN 2065-2992</p> <ul style="list-style-type: none"> • E. Badea, V.P. Sommer Dorte, K. Mühlen Axelsson, G. Della Gatta, R. Larsen R. Standardised methods for damage ranking in parchment: from microscopic evaluation to collagen denaturation assessment, <i>e-Preservation Science</i>, 9, 97-109 (2012). ISSN 1854-3928, e-ISSN 1581-9280. • E. Badea, L. Miu, P. Budrugaec, M. Giurginca, A. Mašić, N. Badea, G. Della Gatta, <i>Study of deterioration of historical parchments by various thermal analysis techniques, complemented by SEM, FTIR, UV-VIS-NIR and unilateral NMR investigations</i>, <i>J. Therm. Anal. Calorim.</i> 91, 17-27 (2008). • O. A. Miu, E. Badea, C. Carsote, S. Ciobanu, Automatic detection of collagen fibres shrinkage activity using Σ-Δ filtering. In <i>Proceedings Book of the 5th International Conference on Advanced Materials and Systems</i>, Editura Certex, Bucuresti, 2014, p. 539-542. • E. Badea, P. Iacomussi, G. Rossi, A. Vitale Brovarone, M. Radis, G. Della Gatta, Studio e diagnosi dello stato di conservazione di pergamene antiche mediante sistemi innovativi di analisi multi spettrale. In <i>Lo Stato dell'Arte 10</i>, Nardini Editore, Florence, 293-298 (2012). ISBN 88-404-4219-7 • G. Della Gatta, E. Badea, DSC complemented by SEM, IR and NMR, an effective diagnostic tool for parchments' damage assessment and preservation monitoring. In <i>Book of Proceedings AICAT 2008, The XXX National Congress on Calorimetry Thermal Analysis and Chemical Thermodynamics</i>, Eds. L. Bernazzani, V. Mollica, M.R. Tiné, p. 168-171, Aracne Editrice, Rome, Italy (2008). <p><u>Patent application</u></p> <ul style="list-style-type: none"> • A/001253-05.07.2014 Automated process of assessing the deterioration degree of historical and archaeological leather and parchment artifacts and objects, authors O.A Miu, E. Badea, O. Grigore, L. Miu. • A/00375-29.05.2018 Composition with antifungal and antibacterial effect for curative and preventive conservation of heritage collagen-based objects, authors L. Miu. M. Crudu, D. Berechet, C. Sendrea, E. Badea, 	
Institutul Național de Cercetare-Dezvoltare pentru Fizica Materialelor INCDFM				
1.	Analiză de materiale (morfologică, structurală și	• Microscop electronic analitic cu baleiaj și fascicul de ioni focalizat Tescan FIB-SEM Lyra III XMU;	[1] Archaeological Ceramics Studied by Scanning Electron Microscopy <i>J. FROH Hyperfine Interactions</i> 154: 159–176, (2004).	Fixlab

	compozițională) prin microscopie electronică cu baleiaj (SEM)	<ul style="list-style-type: none"> • Microscop electronic analitic cu baleiaj Evo 50 XVP cu accesoriu EDAX (Carl Zeiss NTS); • Laborator pentru preparare probe. 	<p>[2] Applications of Scanning Electron Microscopy in Archaeology, Sandra L.Olsen, Advances in Electronics and Electron Physics Volume 71, 357-380 (1988).</p> <p>[3] Structural and compositional investigation of ancient ceramics from a fortified settlement in south-western Romania, O. Ponta et al. Journal of Molecular Structure 1122, 157-163 (2016).</p>	
2.	Analiza de materiale (morfologică, compozițională și micro/nanostructurală) prin microscopie electronică prin transmisie (TEM)	<ul style="list-style-type: none"> • Microscop electronic prin transmisie analitic JEOL 200CX; • Microscop electronic prin transmisie analitic de înaltă rezoluție JEOL ARM 200F; • Laborator specializat pentru preparări de probe TEM. 	<p>[1] Techniques in Archaeological Geology By Ervan Garrison, Springer Ed (2016).</p> <p>[2] Determining Stone Tool Use: Chemical and Morphological Analyses of Residues on Experimentally Manufactured Stone Tools, A. H. Jahren et al. Journal of Archaeological Science 24, 245–250 (1997).</p> <p>[3] Vindel, E., García, J., Gumiel, C., López-Acevedo, V., and Hernando, M. The Contribution of Transmission Electron Microscopy (TEM) to Understanding Pre-Columbian Goldwork Technology. Archaeometry, 60: 342–349 (2018) .</p>	Fixlab
3.	Analiză de materiale prin rezonanță electronică de spin / rezonanță paramagnetică electronică (RES/RPE)	<ul style="list-style-type: none"> • Spectrometre de RES/RPE echipate cu accesorii de temperatură joasă, pentru măsurători în domeniul de temperatură 3.8 - 300 K. • Spectrometru RES/RPE în banda X (9.8 GHz) în regim continuu model Bruker EMX plus; • Spectrometru RES/RPE în banda Q (34 GHz) în regim continuu model Bruker ELEXSYS E500Q cu accesorii ENDOR (dublă rezonanță electronică și nucleară); • Spectrometru RES/RPE în banda X (9.7 GHz) în regim pulsant model Bruker ELEXSYS E580 cu accesorii ENDOR. B. • Programe specializate pentru analiză și interpretarea spectrelor • Lichfactor de heliu model Cryomech LHeP18, necesar măsurătorilor RES/RPE la T < 80 K. 	<p>[1] Application of EPR in Studies of Archaeological Samples, Chapter · In book: Modern Magnetic Resonance by Laurent Le Pape 1-25, (2016).</p> <p>[2] Skinner A. Electron Spin Resonance (ESR) Dating, General Principles. In: Jack Rink W., Thompson J.W. (eds) Encyclopedia of Scientific Dating Methods. Encyclopedia of Earth Sciences Series. Springer, Dordrecht (2015).</p> <p>[3] Artioli, Gilberto. Scientific methods and cultural heritage: an introduction to the application of materials science to archaeometry and conservation science. Oxford University Press, (2010).</p> <p>[4] Craddock, Paul, ed. Scientific investigation of copies, fakes and forgeries. Routledge, (2009).</p>	Fixlab
4.	Analiză de materiale structurală prin difracție de radiații X	<ul style="list-style-type: none"> • Difractometru de radiații X Bruker D8 Advance; • Programe specializate pentru analiză și interpretarea 	<p>[1] X-Rays for Archaeology. Uda, M., Demortier, G. and Nakai, I. Springer, Amsterdam (2005).</p> <p>[2] X-Ray Diffraction in Cultural Heritage and Archaeology Studies Franceschi, E. <i>Open Access Library Journal</i>, 1, 1-10 (2014).</p>	Fixlab
5.	Studii și caracterizare de materiale prin spectroscopie vibrațională Raman și FTIR	<ul style="list-style-type: none"> • Spectrometru FT RAMAN, model RFS 100/S (Bruker Optics); • Spectrometru FTIR, model VERTEX 70 (Bruker Optics); Accesoriu ATR, model Golden Gate (Specac). 	<p>[1] Raman Spectroscopy in Art and Archaeology, Ludovic Bellot-Gurlet et al., J. Raman Spectrosc. 37: 962–965 (2006).</p> <p>[2] Fourier Transform Infrared Spectroscopy (FT-IR) in Archaeological Ceramic Analysis , Shlomo Shoval</p>	Fixlab

			The Oxford Handbook of Archaeological Ceramic Analysis <i>Edited by Alice Hunt (2016).</i>	
6.	Studii și caracterizare de materiale prin spectroscopie optică de luminescență	•Spectrofluorimetre modele Fluorolog 3-22 și Fluoromax 4P (Horiba Jobin Yvon);	[1] Artioli, Gilberto. Scientific methods and cultural heritage: an introduction to the application of materials science to archaeometry and conservation science. Oxford University Press, (2010). [2] Edwards, Howell, and Peter Vandenberg, eds. Analytical archaeometry: selected topics. Royal Society of Chemistry, (2012).	Fixlab
7.	Analiză compozițională de materiale prin fluorescență de radiații X	•Echipament WDXRF Bruker S8 TIGER 1 kW; •Software pentru control și analiză;	[1] A study of ancient pottery by means of X-ray fluorescence spectroscopy, multivariate statistics and mineralogical analysis Christina Papachristodoulou at al. Analytica Chimica Acta 573–574, 347–353 (2006). [2] Energy dispersive X-ray fluorescence analysis of ancient copper alloys Empirical values for precision and accuracy, J. Lutz and E. Pernicka, <i>Archaeometry</i> 38, 2, 313-323 (1996).	Fixlab
8.	Analiza proprietăților materialelor dependente de temperatură și a proceselor fizico-chimice care au loc în materiale sub acțiunea temperaturii	•Perkin Elmer Diamond Thermogravimeter: 20 - 1550C; •Netsch Differential Scanning Calorimeter: -180-700 C; •SETARAM DTA/DSC Thermogravimeter: 20-1750 C; •Programe specializate pentru analiză și interpretarea datelor.	[1] Pottery firing temperatures: a new method for determining the firing temperature of ceramics and burnt clay Kaare Lund Rasmussen et al. <i>Journal of Archaeological Science</i> 39, 1705-1716 (2012).	Archlab
9.	Analiză de Microscopie FTIR	• Spectrometrul FTIR SPECTRUM 100, cu modalități de lucru, în transmisie/reflexie, scanare; Detector de înaltă performanță MCT răcit cu azot lichid; •Software pentru control și analiză; •FTIR Imaging System SPOTLIGHT 400.	[1] Use of FTIR-microspectrometry in examinations of artistic and historic works Materials issues in art and archaeology. E. V. Sayre, P. Vandiver, J. Druzik and C. Stevenson. Reno, Nevada, USA, Materials Research Society. 123: 71-76 (2011).. [2] Bruni, S., F. Cariati, et al. Spectrochemical characterization by microFTIR spectroscopy of blue pigments in different polychrome works of art, <i>Vibrational Spectroscopy</i> 20: 15-25 (1999).	Archlab
10.	Analize de arheometrie și autentificări de obiecte arheologice (ceramică arsă)	• Echipament de termoluminescență TLD 3500 (Harshaw) 25-600C, rate de încălzire 1-7C/sec., în atmosferă controlată; opțional, diferite profiluri timp-temperatură.	[1] Use of luminescence dating in archaeology To cite this article: James K Feathers <i>Meas. Sci. Technol.</i> 14 1493 (2003). [2] Aitken M.J. Thermoluminescence Dating Academic Press London (1985).	Archlab

Universitatea VALAHIA

1.	Caracterizarea morfologică a suprafețelor, analiza compozițională (calitativ și cantitativ) și distribuția elementelor pe suprafața probelor	MICROSCOP ELECTRONIC CU BALEIAJ (SEM) SU-70 CUPLAT CU SPECTROMETRU CU DISPERSIE DUPĂ ENERGIE (EDS)	1. ATR-FTIR and SEM-EDS Analyses of Lumea Noua Painted Pottery from Alba Iulia-Lumea Noua Neolithic Site, A. Bintintan, M.Gligor, I.D.Dulama, S.Teodorescu, R.M.Stirbescu, C.Radulescu, <i>Revista de Chimie</i> , 68(4), pp.847-852, 2017. http://revistadechimie.ro/pdf/44%20BINTINTAN%20A%204%2017.pdf	FIXLAB
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			<p>2. Contract 2734/2017: Analize fizico-chimice asupra unor probe de chirpici provenind dintr-o locuință eneolitică arsă din cultura Gumelnița, beneficiar Muzeul Național de Istorie a României.</p> <p>3. Teza de doctorat: Confecționarea ceramicii pictate neolitice și eneolitice din transilvania: date arheologice, investigații arheometrice și experimentale, Marian (Bințișan) Alina http://doctorate.uab.ro/upload/63_1402_rezumat_teza_ro.pdf.</p> <p>4. Calcium Oxalate on Limestone Surface of Heritage Buildings, Key Engineering Materials, 750, pp. 129-134, 2017</p>	
2.	Analiza spectrală în infraroșu	SPECTROMETRU IR CU TRANSFORMATĂ FOURIER (FT-IR) CUPLAT CU MICROSCOP IR DE ÎNALTĂ REZOLUȚIE	<p>1. ATR-FTIR and SEM-EDS Analyses of Lumea Noua Painted Pottery from Alba Iulia-Lumea Noua Neolithic Site, A. Bintintan, M.Gligor, I.D.Dulama, S.Teodorescu, R.M.Stirbescu, C.Radulescu, Revista de Chimie, 68(4), pp.847-852, 2017. http://revistadechimie.ro/pdf/44%20BINTINTAN%20A%20A%204%2017.pdf</p> <p>2. Contract 2734/2017: Analize fizico-chimice asupra unor probe de chirpici provenind dintr-o locuință eneolitică arsă din cultura Gumelnița, beneficiar Muzeul Național de Istorie a României.</p> <p>3. Teza de doctorat: Confecționarea ceramicii pictate neolitice și eneolitice din transilvania: date arheologice, investigații arheometrice și experimentale, Marian (Bințișan) Alina http://doctorate.uab.ro/upload/63_1402_rezumat_teza_ro.pdf.</p> <p>4. Calcium Oxalate on Limestone Surface of Heritage Buildings, Key Engineering Materials, 750, pp. 129-134, 2017</p>	FIXLAB
3.	Analiza structurală a probelor prin difracție de raze X	Difractometru de raze X (XRD)	Contract 2734/2017: Analize fizico-chimice asupra unor probe de chirpici provenind dintr-o locuință eneolitică arsă din cultura Gumelnița, beneficiar Muzeul Național de Istorie a României.	FIXLAB
4.	Scanarea 3D a obiectelor de patrimoniu	Scanner portabil 3D EXASCAN	<p>3D-Reconstruction of the Complex Stuccoes from Patrimony Buildings, R.M.Ion, V.Gurgu, I.A.Bucurica, S.Teodorescu, M.L.Ion, D.Postolache, I.Darida, Proceedings of Digital Presentation and Preservation of Cultural and Scientific Heritage, Vol. 7, pp. 107-112, 2017. https://www.researchgate.net/publication/319630073_3D-Reconstruction_of_the_Complex_Stuccoes_from_Patrimony_Buildings [accessed May 14 2018].</p>	MOLAB
5.	Analiza spectrală Raman	SPECTROMETRU RAMAN PORTABIL CU DOUĂ LUNGIMI DE UNDĂ ÎN IR XANTUS-2	Calcium Oxalate on Limestone Surface of Heritage Buildings, Key Engineering Materials, 750, pp. 129-134, 2017	MOLAB / FIXLAB
Institutul Național de Cercetare – Dezvoltare pentru Geologie și Geoecologie Marină GEOECOMAR				
01	Geologie sedimentologie - Cartare geologica.	si Sistem de carotaj cu percutie		Molab

	<ul style="list-style-type: none"> - Investigatii sedimentologice. - Studii ale proceselor sedimentare, stratigrafice și paleobiologice din ambele domenii, marin și continental, la diferite scări în timp și spațiu. - Datele sedimentologice sunt folosite pentru interpretarea batimetriei, hidrografiei, a sistemelor de paleocurenți, a arhitecturii sedimentare a bazinelor precum și a schimbărilor eustatice ce au avut loc în decursul timpului geologic. 			
02	<p>Batimetrie și seismo-acustică:</p> <ul style="list-style-type: none"> - Suport pentru cercetarea fundamentală în sedimentologie, limnologie, geologie marină, dinamica sedimentelor. - Cercetare aplicativă pentru dinamica și structura 	<p>Multibeam Echosounder ELAC SeaBeam 1050D; Ecosondor multifascicul ELAC 1050D</p> <p>Single beam scientific echosounder Ceeducer; Ecosondor monofascicul Ceeducer</p> <p>Single beam scientific echosounder ELAC Hydrostar 4300, dual frequency; Ecosondor monofascicul ELAC Hydrostar 4300</p>	<p>MAR-S: http://intranet.geocomar.ro/mars/</p> <p>HERAS: http://www.herasprojectcbc.eu/descriere_proiect.html</p> <p>PN 1816 0502</p>	Molab

	<p>sedimentelor în zona costieră, de șelf marin și panta continentală.</p> <ul style="list-style-type: none"> - Determinarea DTM și structura sedimentelor pentru aplicații geinginerești subacvatice și lucrări de infrastructură (conduce, platforme, eoliene, etc). - Cartarea și cuantificarea geohazardelor asociate structurilor sedimentare; - Cartarea habitatelor subacvatice de fund; - Cautarea, localizarea și identificarea obiectelor scufundate (structuri, conduce, epave, UXO, alte obiecte scufundate) 	<p>Single beam echo sounder Cee Hydrosystems Cee-Line Ecosondor monofascicul Cee HydroSystems Cee-Line</p> <p>EdgeTech XS-3200 chirp sub-bottom profiler 0.5-12 kHz and 2-16 kHz towfishes;</p> <p>Side scan sonar dual frequency Klein L3900; Sonar lateral Klein L3900 Side scan sonar dual frequency GeoAcoustics; Sonar lateral GeoAcoustics</p> <p>SVP (Sound Velocity Profiler) SVP (Echipament pentru măsurarea vitezei sunetului în apă)</p> <p>Motion Reference Unit and fiber optics gyroscope IXsea Octans for echousounding corrections. Senzor de mișcare IXSea Octans</p> <p>CEETIDE hydrographic survey precision radar tide gauge recorder</p>		
03	<p>Topografie:</p> <ul style="list-style-type: none"> - Ridicări topografice de detaliu și mare detaliu. 	<p>Trimble M3 Mechanical Total Station</p> <p>Trimble R3 GPS Surveying System</p> <p>Trimble Business Office software</p> <p>Topcon Tools software</p>		Molab
04	<p>Gravimetrie și magnetometrie:</p>	<p>Geometrics G-882 marine magnetometer</p> <p>Geometrics G-856AX terrestrial magnetometer</p>	<p>MAR-S: http://intranet.geocomar.ro/mars/</p>	Molab

<ul style="list-style-type: none"> - Cercetări magnetometrice, terestre și marine, la scări foarte variate, cuprinse între foarte mare detaliu (1:500 – 1:5.000) și regională (1:200.000 – 1:500.000). Sunt avute în vedere toate fazele procesului de cercetare: proiectarea lucrărilor, executarea măsurătorilor de teren și laborator, procesarea datelor, interpretarea, modelarea și reprezentarea grafică a rezultatelor. - Ridicări geofizice de mare și foarte mare detaliu pentru caracterizarea complexă a unor situri de interes (locații de foraj, site-uri arheologice, etc.) și pentru localizarea unor obiecte acoperite de apă și/sau sedimente (conducte, epave, ancore, lanțuri, penetrometre, etc.). - Modelarea 2D-3D a datelor gravimetrice și magnetometrice, 	<p>MagLog data acquisition software</p> <p>MagMap2000 post-acquisition processing software</p> <p>Geosoft Oasis Montaj software</p>	<p>HERAS: http://www.herasprojectcbc.eu/descriere_proiect.html</p>	
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	integrarea informațiilor seismice, de foraj, petrofizice, geologice, etc. și elaborarea de modele de simulare geofizică a structurilor geologice ascunse, adânci și/sau superficiale.			
05	GIS si baze de date - Crearea, întreținerea și exploatarea bazelor de geodate de tip DPA (Data Processing and Analysing) dedicate pentru informațiile gravimetrice, magnetometrice, batimetrice, geo- și hidro-chimice, sedimentologice, etc.		MAR-S: http://intranet.geoecomar.ro/mars/ HERAS: http://www.herasprojectcbc.eu/descriere_proiect.html	Digilab
06	Observatii directe subacvatice - Scuba diving		MAR-S: http://intranet.geoecomar.ro/mars/ HERAS: http://www.herasprojectcbc.eu/descriere_proiect.html	Molab
07	Geo-arheologie - Investigarea magnetometrica a siturilor arheologice, atat pe uscat cat si in arii submerse; - Investigarea electrometrica a	Gradientmetru protonic tip Geometrics 856 Susceptibilimetru tip KT6 Magnetometru marin cu cesiu tip Geometrics 882 (camp geomagnetic total)	MAR-S: http://intranet.geoecomar.ro/mars/ HERAS: http://www.herasprojectcbc.eu/descriere_proiect.html Anghel S., 2017. Magnetometric and electrometric investigation in Troesmis archaeological site, Proceedings of the 23th Annual Meeting of the European Association of Archaeologists	Molab

	<p>siturilor arheologice , atat pe uscat cat si in arii submerse;</p> <p>- Masuratori de susceptibilitate magnetica;</p>	<p>Magnetometru protonic tip Geometrics 856 (variatie diurna)</p> <p>Electrometru AGI Ministing (sondaj electric vertical si PI)</p> <p>Electrometru tip Intel 91 (sondaj electric vertical)</p> <p>Electrometru tip Intel 91 (sondaj electric vertical) cu streamer de 100 m si prize cu echidistanta de 5m Detector de metale</p>	<p>Anghel S., 2009. Geophysical research for revealing and studying of ancient ruins in the archaeological site "Argamum", Proceedings of the 9th SEGJ International Symposium, Sapporo, Japan, 12-14 October 2009: pp. 1-4. print ISBN: 978-4-938493-06-6, https://doi.org/10.1190/segj092009-001.51</p> <p>Ioane D., Anghel S., Dudu A., 2009. Magnetic Prospection of a Tumulus in the Ancient Histria Necropolis, GeoEcoMarina 15, pp. 161 – 165 https://www.geoecomar.ro/website/publicatii/Nr.15-2009/17_ioane_BT.pdf</p>	
08	<p>Paleobiologie si Paleontologie</p> <p>- Paleontologia vertebratelor și nevertebratelor</p> <p>- Micropaleontologie</p> <p>- Analiza multivariată a conținutului micropaleontologic pe baza datelor calitative și cantitative în scopul realizării reconstituirilor de paleomediu.</p>			Molab
09	<p>Laborator de chimie/geochimie</p> <p>- Determinarea principalilor parametri fizico-chimici pe probe de apă (conductivitate, pH, Eh, concentrația</p>	<p>Spectrometru AAS SOLAAR 939E, GC-MS Agilent 7890N/5975C</p> <p>Spectrofotometru UV-VIS Perkin Elmer Lambda 35</p> <p>Echipeamente auxiliare și de teren.</p>		Fixlab

	<p>și saturația oxigenului dizolvat)</p> <ul style="list-style-type: none"> - Determinarea concentrațiilor nutrienților în probe de apă (SiO₂, PO₄, NO₃, NO₂, NH₄). - Determinarea concentrațiilor clorofilelor <i>a</i>, <i>b</i> și <i>c</i> în apă. - Determinări de metale grele în probe de apă marină și dulce, probe de sedimente marine, fluviale și lacustre, alte tipuri de probe. - Determinarea unor componente majori în probe de apă și sediment - Analize chimice anorganice și organice (PAH) pe probe de apă, sedimente și de altă natură 			
10	Biologie			Molab
12	Harti			Archlab
11	Laboratoare			Fixlab
13	Mare Nigrum – nava de cercetare marina			Molab
14	Istros – nava de cercetare fluviala			Molab