

FIȘA DE EVIDENȚĂ Nr. 224 - / 2017					TABEL NR. 1 ²	
a rezultatelor activităților de cercetare-dezvoltare						
DENUMIREA PROIECTULUI	Combined experimental researches of metallic nanoparticles: structural characterization and effect control on environmental microorganisms metabolic activity			CATEGORIA DE PROIECT CD		
CONTRACT DE FINANȚARE	Nr. 39/10.04.2017	DURATA CONTRACT	12 LUNI	ACRONIM PROGRAM	-	
VALOAREA PROIECTULUI (INCLUDE ȘI ALTE SURSE)			VALOAREA CONTRACTULUI DE FINANȚARE (BUGET DE STAT)	2500 USD		
REZULTATELE CERCETĂRII APARTIN	1 Universitatea Aalexandru Ioan Cuza din Iasi 2 IUCN-DUBNA		CONFORM Order No. nr.39/10.04.2017			

1) DENUMIRE REZULTAT ³	Articole stiintifice		CARACTERISTICI ALE REZULTATULUI FINAL
2) CATEGORIA REZULTATULUI (conform art. 74, O.G. 57/2002)	Rezultat final	Rezultate ⁴ intermediare	
2.1 documentații, studii, lucrări	X	X	Au fost studiate efectele suspensiilor coloidale de nanoparticule metalice (obținute pe cale chimică) asupra activității enzimelor stresului oxidativ (superoxid dismutaza, catalaza) și peroxidării lipidelor (cuantificata prin cantitatea de malondialdehidă) la două specii de fungi celuloyolitici (<i>Chaetomium globosum</i> și <i>Phanerochaete chrysosporium</i>).
2.2 planuri, scheme	<input type="checkbox"/>	<input type="checkbox"/>	
2.3 tehnologii	<input type="checkbox"/>	<input type="checkbox"/>	
2.4 procedee, metode	<input type="checkbox"/>	<input type="checkbox"/>	
2.5 produse informatice	<input type="checkbox"/>	<input type="checkbox"/>	
2.6 rețete, formule	<input type="checkbox"/>	<input type="checkbox"/>	
2.7 obiecte fizice / produse	<input type="checkbox"/>	<input type="checkbox"/>	
2.8 brevet invenție / altele asemenea	<input type="checkbox"/>	<input type="checkbox"/>	
3) STADIUL DE DEZVOLTARE	3.1 soluție/ model conceptual	<input type="checkbox"/>	Rezultatele cercetării:
	3.2 model experimental/ funcțional	<input type="checkbox"/>	
	3.3 prototip	<input type="checkbox"/>	
	3.4 instalație pilot sau	<input type="checkbox"/>	

¹ denumirea persoanei juridice executante (persoană juridică executantă este considerată persoana juridică care a obținut rezultatele cercetării, în mod nemijlocit, conform art. 74 alin. (3) [din O.G. nr. 57/2002](#))

² se completează o singură dată, la 30 de zile de la data aprobării raportului de activitate al proiectului de cercetare-dezvoltare

³ se trece denumirea rezultatului cercetării (nu se trece denumirea proiectului)

⁴ se trec rezultatele cercetării din etapele intermediare ale proiectului de cercetare-dezvoltare care pot fi utilizate / valorificate independent de includerea în rezultatul final

4) DOMENIUL DE CERCETARE	echivalent	
	3.5 altele	<input type="checkbox"/>
	4.1 tehnologiile societății informaționale	<input type="checkbox"/>
	4.2 energie	<input type="checkbox"/>
	4.3 mediu	<input type="checkbox"/>
	4.4 sănătate	<input type="checkbox"/>
	4.5 agricultură, securitatea și siguranța alimentară	<input type="checkbox"/>
	4.6 biotehnologii	<input type="checkbox"/>
	4.7 materiale, procese și produse inovative	<input type="checkbox"/>
	4.8 spațiu și securitate	<input type="checkbox"/>
4.9 cercetări socio-economice și umaniste	<input type="checkbox"/>	
5) DOMENII DE APLICABILITATE⁵		7211 <input type="checkbox"/> ; <input type="checkbox"/> ; <input type="checkbox"/>

• **Lacramioara OPRICA¹, Maria BALASOIU^{2,3}, Alexander KUKLIN², Liviu SACARESCU⁵, Dorina CREANGA⁴, STUDY ON OXIDATIVE EFFECTS OF MAGNETIC AND NON-MAGNETIC NANOPARTICLES IN ENVIRONMENTAL FUNGI, 1" Alexandru Ioan Cuza" University, Faculty of Biology, Iasi, Romania, 2 Joint Institute for Nuclear Research, Dubna, Russian Federation, 3 " Horia Hulubei" Institute of Physics and Nuclear Engineering, Bucharest, Romania, 4" Alexandru Ioan Cuza" University, Faculty of Physics, Iasi, Romania, 5 "P. Poni" Institute of Macromolecular Chemistry, Iasi, Romania (Poster presented at 3rd International Summer School and Workshop „Complex and Magnetic Soft Matter Systems: Physico-mechanical properties and structure”Dubna 27-30 iunie 2017(CMSMS 2017)**

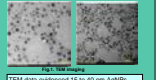
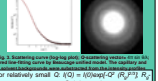
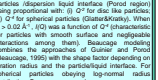
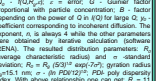
• **L. Oprica¹, M. Andries², D. Creanga², L. Sacarescu³, SILVER NANOPARTICLES AND ENVIRONMENTAL MICROORGANISMS, 1"Alexandru Ioan Cuza" University, Biology Faculty, Iasi, Romania, 2"Alexandru Ioan Cuza" University, Physics Faculty, Iasi, Romania, 3"P. Poni" Institute of Macromolecular Chemistry, Iasi, Romania (Poster prezentat at „Condensed Matter Research at the IBR-2”Dubna 7-11 octombrie 2017(CMSMS 2017)**

• **Maria ANDRIES¹, Daniela PRICOP¹, Liviu SACARESCU², Lacramioara OPRICA³, Andrea VERDES TEODOR¹, Dorina CREANGA¹, Maria BALASOIU^{4,5}, 2017, PHOTOCHEMICAL SYNTHESIS OF NOBEL METAL NANOPARTICLES FOR BIOMEDICAL USE, 1Faculty of Physics, Alexandru Ioan Cuza University, 11 Blv. Carol I, Iasi, Romania, 2 P. Poni Institute of Macromolecular Chemistry, Iasi, Romania, 3 Faculty of Biology, Alexandru Ioan Cuza, 11, Blv. Carol I, Iasi, Romania, 4 INFLPR- Bucharest, Magurele, Romania, 5 IUCN-Dubna,IFIN-HH Magurele, Romania (poster presented at Int Balkan Workshop of Applied Physics, Constanta).**

• **Maria ANDRIES¹, Larisa POPESCU¹, Lacramioara OPRICA², Liviu SACARESCU³, Dorina CREANGA¹, 2017, STUDY ON THE INTERFACE PHENOMENA OF CITRATE/AG COLLOIDAL NANOSYSTEMS WITH SOME MICROORGANISMS, 1Faculty of Physics, "Alexandru Ioan Cuza" University, Iasi, Romania 2Faculty of Biology, "Alexandru Ioan Cuza" University, Iasi, Romania 3Petru Poni , (Poster presented at 20th Romanian International Conference on Chemistry and Chemical Engineering, 6 – 9 September 2017 Poiana Brasov, Romania)**

SILVER NANOPARTICLES AND ENVIRONMENTAL MICROORGANISMS

L.Oprica¹, M. Andries², D. Creanga², L. Sacarescu³
¹Alexandru Ioan Cuza" University, Biology Faculty, Iasi, Romania
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³"P. Poni" Institute of Macromolecular Chemistry, Iasi, Romania

<h4 style="text-align: center; margin: 0;">Abstract</h4> <p style="font-size: x-small; margin: 0;">Silver nanoparticles suspensions are remarkably efficient as light absorbers and scatterers, their color depending on the size and the shape of the particles. The catalytic nanoparticles were tested by chemical reduction method. Transmission Electron Microscopy (TEM) revealed 15 to 40 nm diameter, small angle X-ray Scattering (SAXS) indicated particle growth radius of 15.1 nm. UV-vis recording suggested about 30 nm of NPs diameter. The biological impact of such nanoparticles on the environmental microorganisms was shown by means of the changes in protein content, catalase enzyme activity and malondialdehyde level. The results interpretation was based on the silver complex action upon cell adaptation ability in conditions of moderate stress - as in the case of silver containing products released in the environment.</p>	<h4 style="text-align: center; margin: 0;">Introduction</h4> <p style="font-size: x-small; margin: 0;">The AgNPs biopump on the environment where they are delivered following various utilizations was studied in laboratory using as biological material some microorganisms with beneficial action in the biosphere. Such engineered nanomaterials are used in conductive inks, paints and fibers, molecular diagnostic and photonic devices, antimicrobial bodies, and biomedical devices based on the level of silver to provide protection against bacteria. Finally AgNPs are released in the environment so that the issue of cellular risks should be considered at the present time. We studied some bioeffects of engineered silver nanoparticles yielded by classical method - after delivery in the environment. The catalytic fungus <i>Phanerochaete chrysosporium</i> with important role of cellulose waste degrading in the environment was chosen for the experimental approach.</p>
<h4 style="text-align: center; margin: 0;">Methods</h4> <p style="font-size: x-small; margin: 0;">Citrate-Ag nanoparticles yielding chemical reduction method. 1972. An solution of reacting materials was prepared in distilled water. Chemical reagents: silver nitrate AgNO₃ (Chemical Company and Hydronan Chemie Na₂CO₃·2H₂O (Sigma Aldrich). First 50 ml of 1x10⁻³ M AgNO₃ was heated up to boiling. To this solution 5 ml of 1% trisodium citrate was added drop by drop. During the reaction the solution was mixed vigorously. It was heated until color change to pale yellow. Then it was removed from the heating device and stirred until cooled to room temperature. It was expressed as follows: AgNP = xAg₂O/nAg₂ + 25.0x4Ag₂ + C₂H₃O₂ + 3nH₂O.</p> <p style="font-size: x-small; margin: 0;">UV-vis investigation: Shimadzu device with 1 cm quartz cells. Transmission Electron Microscopy imaging: Hitachi High-Tech HT7700 device. SAXS analysis: Nanostar U-Broker system equipped with a Varian 3000 detector (diameter of 200 mm) and an X-ray (λ = 1.54 Å Cu Kα). The angular scale was calibrated by the scattering peaks of a silver halobutyl standard; sample holder - quartz capillary. Measuring: vacuum at constant temperature, 25 °C for 1000 s. Sample-to-detector distance was 107 cm allowing measurements with Q varied between 0.008 Å⁻¹ and 0.3 Å⁻¹. Data analysis was done using the software Bragg-AZtec software and "Tomo" tool suite for data modeling and analysis (Bruker, 2009). Fungal growth test: Subcultured agar-based culture medium in Petri dishes was inoculated with 0.8 cm discs extracted from 7 days old <i>Phanerochaete chrysosporium</i> stock culture. Soluble protein content was assayed according to Bradford method (1976). Catalase activity (CAT), in fungus mycelium was measured according to Sinha (1972), while malondialdehyde (MDA) according to Hodges et al. (1996). CAT and MDA were expressed relatively to the protein content.</p>	<h4 style="text-align: center; margin: 0;">Results</h4>  <p style="font-size: x-small; margin: 0;">TEM data evidenced 15.1 nm AgNPs.</p>  <p style="font-size: x-small; margin: 0;">UV-vis recording suggests about 30 nm AgNPs according to calibration curve (Osberg, 2001).</p>  <p style="font-size: x-small; margin: 0;">UV-vis recording suggests about 30 nm AgNPs according to calibration curve (Osberg, 2001).</p>  <p style="font-size: x-small; margin: 0;">Catalase decomposes hydrogen peroxide (H₂O₂) - released from streptococcus action. In 7 day old large CAT activity diminished to the increase of Ag concentration. MDA content was basal enhanced because of unbalanced proliferation. At 14 days, cell adaptation was observed since catalase synthesis was increased, the percentage of cell membrane lysis became not significant. Malondialdehyde (MDA) is the end product of lipid peroxidation.</p>
<h4 style="text-align: center; margin: 0;">Conclusion</h4> <p style="font-size: x-small; margin: 0;">The adaptation of microorganism cells to the oxidative processes triggered by Ag species is supported by enhanced capacity of synthesis of antioxidant enzymes namely the catalase. The results interpretation was based on the silver complex action on microorganism cells versus the adaptation ability in conditions of moderate stress - as in the case of silver containing products released in the environment. New investigation methods are needed to elucidate the intimate interactions at the interface Ag/biologic cells.</p>	<h4 style="text-align: center; margin: 0;">References</h4> <p style="font-size: x-small; margin: 0;"> P.C. Liu, G. Neri, J. Phys. Chem. B, 2001, 105, 10502-10505. M. Andries, and Stobben, J. 248-254, 1995. S.L. Osberg, High Angle X-ray Scattering, Academic Press (1980). G. Stancu, D. Nedyk (eds.), Small Angle X-ray Scattering, Academic Press (1980). J. K. Stille (Ed.), Analytical Chemistry, 17, 380-394. Hodges D.M., Cheung J.S., Rogers C.J., Powell R.L., (1996) Trends 207, 504-611. A.L., Sinha (1972) Analytical Biochemistry, 47, 580-584. Hodge D.M., Cheung J.S., Rogers C.J., Powell R.L. (1996) Trends 207, 504-611. S. Bratschkow, J. Appl. Catal. 2004, 23, 523. </p>
<h4 style="text-align: center; margin: 0;">Acknowledgement</h4> <p style="font-size: x-small; margin: 0;">This study was sustained by JINR project 04-4-1121/2017</p>	

⁵ conform CAEN 2008, 2 cifre

Study on oxidative effects of magnetic and non-magnetic nanoparticles in environmental fungi
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⁵ P. Poni Institute of Macromolecular Chemistry, Iași, Romania

ABSTRACT
 The study of nanoparticles has become an increasingly important field in a wide range of scientific and technological applications. In this context, the study of nanoparticles exhibits a special interest in environmental fungi. Magnetic nanoparticles are widely used in nanotechnology being highly efficient in numerous cases when traditional materials are not suitable. In this context, the study of nanoparticles exhibits a special interest in environmental fungi. Magnetic nanoparticles are widely used in nanotechnology being highly efficient in numerous cases when traditional materials are not suitable. In this context, the study of nanoparticles exhibits a special interest in environmental fungi.

KEYWORDS AND METHODS
 The study of nanoparticles has become an increasingly important field in a wide range of scientific and technological applications. In this context, the study of nanoparticles exhibits a special interest in environmental fungi. Magnetic nanoparticles are widely used in nanotechnology being highly efficient in numerous cases when traditional materials are not suitable. In this context, the study of nanoparticles exhibits a special interest in environmental fungi.

RESULTS AND DISCUSSION
 The study of nanoparticles has become an increasingly important field in a wide range of scientific and technological applications. In this context, the study of nanoparticles exhibits a special interest in environmental fungi. Magnetic nanoparticles are widely used in nanotechnology being highly efficient in numerous cases when traditional materials are not suitable. In this context, the study of nanoparticles exhibits a special interest in environmental fungi.

CONCLUSIONS
 The study of nanoparticles has become an increasingly important field in a wide range of scientific and technological applications. In this context, the study of nanoparticles exhibits a special interest in environmental fungi. Magnetic nanoparticles are widely used in nanotechnology being highly efficient in numerous cases when traditional materials are not suitable. In this context, the study of nanoparticles exhibits a special interest in environmental fungi.

6) CARACTERUL INOVATIV

6.1 produs nou	<input type="checkbox"/>
6.2 produs modernizat	<input type="checkbox"/>
6.3 tehnologie nouă	<input type="checkbox"/>
6.4 tehnologie modernizată	<input type="checkbox"/>
6.5 serviciu nou	<input type="checkbox"/>
6.6 serviciu modernizat	<input type="checkbox"/>
6.7 altele	<input type="checkbox"/>

Proiectul aduce contribuții cu privire la o cunoaștere mai amănunțită a metabolismului speciilor fungice celulozolice *Chaetomium globosum* și *Phanerochaete chrysosporium* prin introducerea în mediul de cultură a unor concentrații diferite de nanoparticule metalice obținute pe cale chimică.

INFORMAȚII PRIVIND PROPRIETATEA INTELECTUALĂ

documentație tehnico-economică	<input type="checkbox"/>	
cerere înregistrare brevet de invenție	<input type="checkbox"/>	nr. data
brevet de invenție înregistrate (național, european, internațional)	<input type="checkbox"/>	nr. data
cerere înregistrare modele și desene industriale protejate	<input type="checkbox"/>	nr. data

modele și desene industriale protejate înregistrate (național, european, internațional)	<input type="checkbox"/>	nr. data
cerere înregistrare marcă înregistrată	<input type="checkbox"/>	nr. data
mărci înregistrate (național, european, internațional)	<input type="checkbox"/>	nr. data
cerere înregistrare copyright	<input type="checkbox"/>	nr. data
înregistrare copyright (național, european, internațional)	<input type="checkbox"/>	nr. data
cerere înregistrare: rețele, indicații geografice, specii vegetale și animale, etc.	<input type="checkbox"/>	nr. data
înregistrare: rețele, indicații geografice, specii vegetale și animale, etc. (național, european, internațional)	<input type="checkbox"/>	nr. data

TABEL NR. 2⁶

7) VALORIFICAREA REZULTATELOR CERCETĂRII								
8) DENUMIREA REZULTATULUI DE CERCETARE								
NR CRT.	VALOAREA DE LA CARE ÎNCEPE NEGOCIEREA	PROCES VERBAL ⁹ NR./DATA	MOD DE VALORIFICARE ¹⁰	ACTUL ¹¹ PRIN CARE S-A REALIZAT VALORIFICAREA	VALOAREA NEGOCIATĂ ¹²	BENEFICIAR ¹³	IMPACT ¹⁴	PERSOANE AUTORIZATE ¹⁵
0	1	2	3	5	6	7	8	9
1	NA		Studiu	NA	NA	-Universitatea "Alexandru Ioan Cuza" din Iasi -JINR -Dubna (Federatia Rusa)		Responsabil UAIC: Lector dr. Lacramioara OPRICA Responsabil JINR: dr. Alexander KUKLIN

Director de proiect,

Lector dr. Lacramioara OPRICA



⁶ se completează în termen de 10 zile de la data finalizării activităților de valorificare a rezultatului cercetării

⁷ se actualizează pentru fiecare acțiune de valorificare a rezultatului cercetării

⁸ se va trece denumirea rezultatului final sau, după caz, a rezultatului(lor) intermediar(e)

⁹ se vor trece numărul și data la care a fost încheiat procesul verbal al comisiei constituite la nivelul persoanei juridice executante care a stabilit valoarea de la care începe negocierea și se precizează codul procedurii specifice, aprobată la nivelul organului cu atribuții de conducere (ex. consiliul de administrație), în baza căreia se realizează valorificarea rezultatelor obținute în urma activităților de cercetare-dezvoltare, cu respectarea reglementărilor legale în vigoare;

¹⁰ vânzare produs/tehnologie; furnizare servicii; închiriere, concesiune, preluare în producția proprie, transmitere cu titlu gratuit; transfer drepturi de proprietate intelectuală;

¹¹ se va trece nr. și data semnării actului (ex. contract) prin care s-a realizat valorificarea rezultatului cercetării;

¹² valoarea rezultatelor cercetării este stabilită la prețul negociat între părți.

¹³ se completează denumirea beneficiarului care preia rezultatul cercetării (date de contact operator economic, adresă, oraș, județ, telefon, fax, e-mail, website)

¹⁴ se vor completa efectele (economice, sociale, de mediu) obținute la beneficiar asociate aplicării rezultatelor cercetării, anual, pentru o perioadă de 5 ani

¹⁵ numele și semnătura persoanei autorizate să completeze fișa de evidență și al persoanei din cadrul compartimentului financiar-contabil responsabil cu verificarea datelor.