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Book of Abstracts

June 14th-17th, 2023

Sections A & D
Oral Presentations

Time	Authors and coauthors names	Abstract ID & Paper title
15:00-15:20	KN: Daniel I. Quintanilla-Correa, Juan C. Moreno-González, <u>Laura Peña-París</u> , Román Vidaltamayo-Ramírez, Oxana V. Kharissova, Patsy Arquieta, Demófilo Maldonado-Cortés & José A. Sánchez-Fernández	A-1: Mechanical, tribological and cytotoxicity properties of hydrogels reinforced with carbon nanotori
15:20-15:35	IS: <u>Aleksander Lisiecki</u> , Agnieszka Kurc-Lisiecka, Wojciech Pakielka & Santina Topolska	A-2: Microstructure and properties of laser-welded butt joints of X2CrTiNb18 steel
15:35-15:45	Krunoslav Hajdek, Božo Smoljan, Martina Hajdek & Marko Maričević	A-5: Optimization of 3D printing processes of PLA
15:45-15:55	Agnieszka Rzeźnikiewicz, Jacek Górka, Mateusz Przybyła & Monika Kciuk	A-6: Assessment of properties and corrosion resistance of galvanized steel welded with a laser beam
15:55-16:05	Aleksander Lisiecki, Wojciech Pakielka & Agnieszka Kurc-Lisiecka	A-7: Microstructure and properties of laser-welded butt joints of AlSi1MgMn aluminium alloy
16:05-16:15	Ayder Nabiev, Gerasim Tsoy & Gayrat Bahadirov	A-8: Determination of the filtration properties of the semi-finished leather product and moisture-removing cloth
16:15-16:25	Ion Bostan, Petru Stoicev, Gheorghe Poștaru, Alexandru Buga, Ion Bodnariuc, Andrei Poștaru & Andrei Platon	A-9: Particularities of tribological behavior of the contact elements of the precessional gear, made of metallic and plastic materials
16:25-16:35	Elisabeta Mihaela Ciortea	A-10: Cloud manufacturing, a direction towards a sustainable
16:35-16:45	Marius-Valentin Dumitrescu, Fanel-Viore Panaitescu, Mariana Panaitescu Diana-Mariana Cocarta	A-11: Obtaining PET filament and mechanical testing of the resulting elements
16:45-16:55	Cătălin Onuțu, Răzvan-Andrei Polcovnicu, Nicolae Țăranu, Dragoș Ungureanu & Ionuț Alexandru Spiridon	A-12: A review of the additive manufacturing techniques used in the construction area
16:55-17:05	Laurentiu Marin	A-13: Thermal gravimetric analysis (TGA) used to identify the morphology of the graphite films deposited on metal surface by electrical discharge in impulse using pyrolytic graphite cathode
13:30-15:00	Lunch Break	
17:30-17:45	IS: Milica Milošević, Marija Radoičić & Zoran Šaponjić	A-3: Bottom-up creation of multifunctional textile nanoentities using TiO ₂ /Ag nanocrystals
17:45-18:00	IS: Viorel Paunoiu	A-4: Methods for joining by cold plastic deformation
18:00-18:10	Gayrat Bahadirov, Abdusalam Abdukarimov & Akmal Gulmatov	A-14: Review and analysis of transporting devices of roll technological machines
18:10-18:20	Ionel Olaru	A-15: Welded joints studies on the development of brazed aluminum sheets
18:20-18:30	Katarzyna Bialas, Andrzej Dymarek & Tomasz Dzitkowski	A-16: Impact of 3D printer vibration reduction on the quality of its printout
18:30-18:40	Khaoula Maou, Abderrahim Belloufi, Mourad Abdelkrim & Abdelhalim Moumeni	A-17: Delamination factor and trust force prediction of sisal/epoxy composite during the drilling process using RSM/ANN
18:40-18:50	Nikolaos Kladovasilakis, Paschalis Charalampous, Ioannis Kostavelis, Konstantinos Petsios, George Sarris, Dimitrios Tzetzis, Konstantinos Votis & Dimitrios	A-18: Development of heart-like structure employing additive manufacturing technologies

Thursday, June 15th, 2023



Invited Speaker

Paper ID: A-3

BOTTOM-UP CREATION OF MULTIFUNCTIONAL TEXTILE NANO-ENTITIES USING TiO₂/Ag NANOCRYSTALS

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Abstract: With concerns in the areas of environmental safety, biomedicine and healthcare, the need for the development of new multifunctional textile nanocomposites by the efficient and harmless synthesis paths, doesn't stop lasting. Considering extraordinary photocatalytic properties of TiO₂ nanocrystals and the possibility of synthesis of metal nanoparticles (NPs) on their surface (which significantly reduces level of electron/hole recombination in TiO₂ and UV-triggered photoactivation), differently shaped TiO₂ nanocrystals are chosen as building blocks and synthesized - in the form of NPs and nanotubes (NTs), as well as *in situ* synthesized Ag NPs. A method for the synthesis of textile nanocomposites which ensures the realization of the desired multifunctional properties (UV protection, antibacterial activity and/or photocatalytic efficiency), as well as the persistence of the obtained effects, is developed. Apropos, the creation of the final textile nanostructure, single- or double-loaded with TiO₂ nanocrystals and based on different textile materials, included a simple method of *in situ* synthesis of Ag NPs by photoreduction of Ag⁺ ions on the surface of TiO₂ nanocrystals previously deposited on selected textile material. Detailed characterization of TiO₂ and TiO₂/Ag nanocrystals and synthesized textile nanocomposites was performed. The TEM analysis confirmed the existence of TiO₂ NPs and NTs, while the XRD patterns manifested the presence of anatase crystalline structure of TiO₂ NPs/NTs and face centred cubic structure of Ag NPs. By measuring the optical properties (UV/Vis) of colloidal TiO₂/Ag NPs, the successful immobilization of Ag NPs on the surface of TiO₂ NPs, and thus the reduction of Ag⁺ ions, was established. Determination of the possible interactions between Ag⁺ ions and alanine-modified TiO₂ nanocrystals, either in the form of NPs or NTs, was done using FTIR spectroscopy. The creation of textile composites with uniform TiO₂/Ag nano-coating was proved by FESEM, EDX, XRD, Raman, UV/Vis and ICP (or AAS) analysis. Together with the physico-chemical characterization, an assessment of their antibacterial activity (regarding pathogens), UV protective ability, photocatalytic efficiency (using different organic dyes), as well as the durability of the achieved functionalities, was carried out in order to determine the quality of synthesized textile nanocomposites. With this brief overview of the initial ideas and obtained desired results, the creation of new multifunctional textile nano-entities by a selected bottom-up concept is more than justified, and an understanding of the mechanisms of the formation of nanocrystals with controlled shape and size on the surface of textile materials is provided.

Key words: nanocomposites, TiO₂, Ag, photoreduction, multifunctional, textiles.