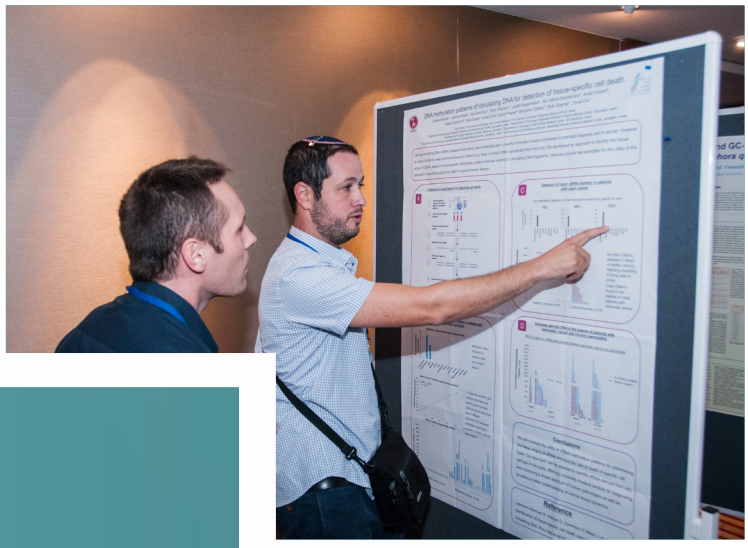
31ST MATERIALS SCIENCE AND ENGINEERING CONFERENCE: ADVANCEMENT & INNOVATIONS

October 15-17, 2018 Helsinki, Finland



Scientific Tracks & Abstracts (Day 1)

Carolina Clausell Terol et al. , Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C5-026

Nanoparticles for soft ferrites: Influence on sintered microstructure

Carolina Clausell Terol[1], Antonio Barba Juan[1], Juan Carlos Jarque Fonfría[1], Luis Nuño-Fernández[2]
[1]Jaume I University, Spain
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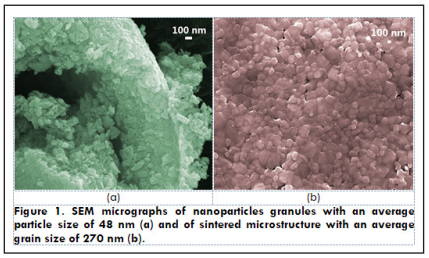

Figure 1. SEM micrographs of nanoparticles granules with an average particle size of 48 nm (a) and of sintered microstructure with an average grain size of 270 nm (b).

Cu-doped NiZn ferrites are typical electromagnetic wave absorbers which absorption capacity (calculated from experimental measures of complex permeability and complex permittivity for a given frequency range) is related to thickness body and especially and more critical to its microstructure. Ideal microstructure would consist of sintered bodies with no porosity, small average grain size and narrow grain size distribution. Moreover, the finer grain sizes the better absorption capacity. Literature shows that physical properties of ceramic bodies improve when particle-size distribution decreases from the micro-scale to the nano-scale. Ferrites from nanoparticles have been sintered controlling average grain size and relative density with sintering temperature. Green microstructure has been set constant using uniaxial dry pressing at 200 MPa as the shaping method. Sintered microstructure has been observed by Scanning Electron Microscopy (SEM), obtaining the average grain size by image analysis of the SEM micrographs. Relative density was determined by the Archimedes method, using true density material value. Magnetic permeability was measured in the frequency range from 1 MHz to 3 GHz by using an Agilent model E4991 ARF impedance analyzer with the 16454A test fixture and this later parameter has been related to average grain size and relative density. Finally, the results obtained from nano-particulate ferrite powder have been compared with those previously obtained from micro-particulate ferrite powders, noting an improvement in performance.

Aknowledgements

The study has been partially funded by the Spanish National Plan for Scientific Research, Development, and Technology Innovation of the Spanish Minister of Economy and Competitiveness (project MAT2016-76320-R) and the Jaume I University of Spain (project UJI-B2017-48).

Biography

Carolina Clausell Terol has completed her PhD in Chemical Engineer in 2008 and MSc in Chemical Engineer in 1998, both from Jaume I University. She is the Member of the Ceramic Technology research group since 1997 and since 2012, teaching and research staff at the Chemical Engineering Department of the same university. Her research career is focused in the application of the chemical engineering principles to the ceramic materials production processes, which she develops at the research group and the department that she belongs to. Furthermore, she is a Member of the collaborating research group chemistry of electromagnetic radiation processed materials between the Jaume I University and the Spanish National Research Council (CSIC), through the Aragón Materials Science Institute (ICMA). She has collaborated in 38 research projects, funded by public institutions and private companies, resulting in 2 patents, numerous scientific articles in international journals of the ceramic materials field indexed in the journal citation report and several contributions to national and international conferences of the same research field.

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Notes:

Rosalinda Caringella et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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Novel flax composites functionalized by polypyrrole for shipbuilding application

Rosalinda Caringella, Alessia Patrucco, Marina Zoccola and Claudio Tonin
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In this research work novel polymeric composites reinforced with functionalized natural fibers have been produced, in order to replace fiberglass reinforcement in shipbuilding industry. The substitution of glass fibers with ligno-cellulosic fibers brings advantages also in terms of weight of the composites which results lighter than fiberglass ones, moreover it solves the issues linked to the complexity of the disposal procedure and the health risk of fiberglass composites. Different types of technical flax fabrics and felts, having different weight and fibers orientation were used as reinforcement after functionalization by polypyrrole, a conductive organic polymer which confers antistatic and EMI shielding properties, bacterial resistance and good compatibility with non-polar polymeric matrices. Polypyrrole functionalization was carried out by in situ polymerization of pyrrole monomer, using ammonium persulfate as oxidant. The fabrics were dipped in pyrrole and oxidant solutions for 2 hours under mechanical stirring then a polyester resin commonly used in shipbuilding industry was applied on treated fabrics to produce the composites. The composites were characterized for surface functionalization, morphology, thermal and mechanical behavior in order to establish their applicability in shipbuilding industry. Chemico-physical characterization showed that polypyrrole functionalization not affected the compatibility between fabrics and polyester resin. The novel composites exhibit lowest tenacity and elastic modulus than fiberglass but showed comparable specific module, considering the specific density of the materials. Thermal analysis showed that functionalized fabrics degraded at slightly lower temperature but with lower heat release rate of the degradation process. The shift of the degradation temperature resulted more evident with the increase of the amount of polypyrrole on fabrics surface. Moreover, the composites reinforced with flax fabrics showed a significant reduction of the carbon residue which can be traduced into an advantage in terms of disposal by incineration and solves the problem of glass fibers dispersion.

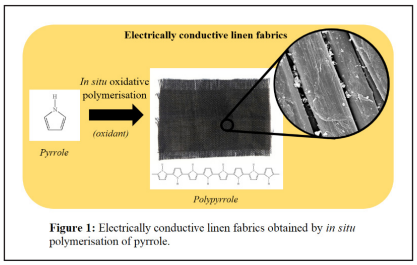

Figure 1: Electrically conductive linen fabrics obtained by *in situ* polymerisation of pyrrole.

Biography

Rosalinda Caringella has been graduated in Chemistry from the University of Turin in 2012. Since 2014, she has been working as Temporary Research Assistant at the Institute for Macromolecular Studies (ISMAC) of the Italian National Research Council (CNR). She has worked on the functionalization of natural fibers, preparation of bio-composites and valorization of wool wastes and extraction of keratin for biomedical, textile and pharmaceutical applications.

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Meral Karakisla Sahin, Res. Rev. J Mat. Sci. 2018, Volume 6
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31ST MATERIALS SCIENCE AND ENGINEERING CONFERENCE: ADVANCEMENT & INNOVATIONS

October 15-17, 2018 Helsinki, Finland

The preparation and characterization of polyacrylonitrile fiber-g-poyl (hydroxyethyl methacrylate) copolymer by graft copolymerization technique

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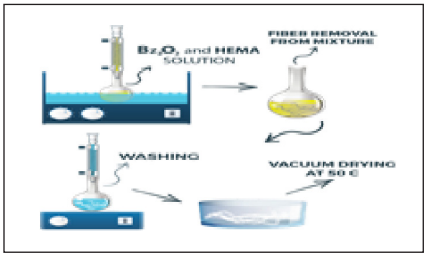

Polyacrylonitrile (PAN) fiber is used in the textile industry frequently and has a prominent place among the synthetic fibers. It has good thermal stability, compatibility with polar materials due to containing the high polar nitrile groups, hardness and high abrasion resistance. However, in spite of many superior properties of PAN fibers, some of their poor features such as low moisture absorption and poor antistatic properties limit their further usage. So, surface modification is particularly important for fiber/fabric materials and in order to modify of surface of PAN fiber, functional monomers can be incorporated into fiber structure. One of the mostly used methods for this purpose, graft copolymerization method was used to graft Hydroxyethyl Methacrylate (HEMA) onto PAN fiber directly to get the surface modified fibers. The grafting processes were carried out in aqueous medium containing benzoyl peroxide solution in acetone as initiator and HEMA solution at suitable concentrations. PAN fibers grafted HEMA at different percentages was prepared depend on the polymerization conditions such as initiator and monomer concentration, polymerization temperature. Grafting yield was determined gravimetrically and the maximum grafting yield was obtained as about 90% under the conditions investigated. The chemical structure of PAN fiber-g-poly(hydroxyethyl methacrylate) was characterized by FTIR and H-NMR spectroscopic techniques. The surface morphology of the grafted fiber was studied by SEM.

Biography

Meral Karakisla Sahin is a Professor in the Department of Chemistry, Faculty of Science, Ankara University since 2009. She has her expertise in the of area of conducting polymer composites, the synthesis of conducting polymers and applications, the preparation of graft copolymers, the synthesis of Schiff base polymers, the preparation of composite by improving their conductivity of textile and clay materials by using conducting polymers. In addition, she has made studies on the investigation of antibacterial and catalytic properties after deposition of silver nanoparticles to these composites and to prepare shielding material against to electromagnetic waves.

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Notes:

Kevin Raheem, Res. Rev. J Mat. Sci. 2018, Volume 6
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Investigation of cyanoacrylate adhesive bond curing and durability using Raman spectroscopy and electrochemical impedance spectroscopy

Kevin Raheem
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Cyanoacrylate (CA) polymerization is normally triggered by traces of basic substances at the adhesive/substrate interface resulting in rapid formation of large molecular weight polymers. However there are some disadvantages, for instance, increasing the bond gap from 10 microns (zero gap bonds) to 100 microns can increase bond fixture time from a few seconds up to several minutes, sometimes limiting their service capabilities. The aim of this work is to use Raman spectroscopy and other surface analytical and chemical laboratory techniques to gain improved understanding of the processes responsible for performance limitations of such adhesives. Raman will be employed to provide insights into the rates and mechanisms of the interfacial CA polymerization process, which are known to be independent of bulk polymerization processes. In addition, the examination of the time-dependent and spatial behavior of EIS data in conjunction with a mathematical model based on the diffusion of monomeric and/or polymeric species through the adhesive volume will aid our understanding of the polymerization processes occurring in various regions of the adhesive bond including the edge and the bulk material. By studying the effects of chemical and physical variations the fundamental questions regarding the degradation of adhesive joints by environmental stress will be addressed thereby enhancing our knowledge of the hydrolytic stability of CA adhesive bond.

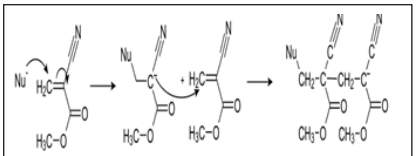

Figure-1: Reaction mechanism for the polymerization of ethyl cyanoacrylate.

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Notes:

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Amir Parsi et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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31ST MATERIALS SCIENCE AND ENGINEERING CONFERENCE: ADVANCEMENT & INNOVATIONS

October 15-17, 2018 Helsinki, Finland

Development of high strength- high porosity Si_3N_4 bodies via a modified gel-casting process

Amir Parsi, Farhad Golestanifard*, Seyyed Mohammed Mirkazemi
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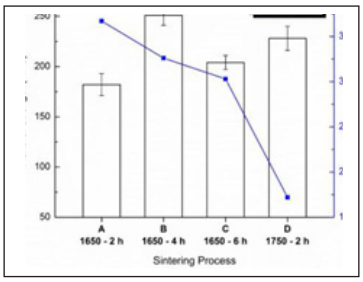
Porous Si_3N_4 bodies are of interest in various applications including bio and aerospace. Silicon nitride bodies were prepared with porosity and flexural strength of about 38% and near 180 MPa, respectively. The processing was via gel-casting method employing acrylamide (AM) and N,N'–methylene bisacrylamide (MBAM) for primary slurry, followed by coke bed sintering. The concentrations of APS and TEMED as initiator and catalyst, the sintering time and temperature were studied and optimized. Phase evolution and microstructure observation, as well as flexural strength and porosity of porous Si_3N_4 bodies, were investigated. It was found above, sintering process at 1650 °C with prolonged time had a significant effect on strength in a way that bodies with 33% porosity could experience of 250 MPa. Development of interlocking microstructure of fine β-Si3N4 grains was found to be the key factor for increase of strength. Controlling the primary slurry components was also vital for maintaining the high strength. The results were explained with emphasis on potential applications.



Biography

Amir Parsi received the B.Sc. degree in Materials Science and Engineering from Sharif University of Technology (SUT), Tehran, Iran, in 2012, and the M.Sc. degree in Ceramic Engineering from Iran University of Science and Technology (IUST), Tehran, Iran, in 2015. Since then, he has been working under supervision of Prof. Golestanifard in the Refractory and Ceramic Synthesis Lab in the IUST. He is not carrying on research on synthesis ceramic powders but also being the lab manager. He has won the Best Poster Award from 10th Congress of the Iranian Ceramic Society (ICerS) & First International Conference on Advanced Ceramics for a paper entitled "Rheological Properties of Silicon Nitride Slurries for Gelcasting". In recent years, he has focused on preparing porous Silicon Nitride ceramic bodies with high strength with the intention of utilizing in bio applications.

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Lali Gurchumelia et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C5-026

Elaboration of new types, environmentally safe fire-extinguishing powders and establish the conditions of extinguish optimum and effective use of such powders

Lali Gurchumelia[1], Murman Tsarakhov[1], Tengiz Machaladze[1], Salome Tkemaladze[2] and Feliks Bejanov[3]
[1]R Agladze Institute of Inorganic Chemistry and Electrochemistry, Georgia
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The aim of the presented investigation is the development of technology for production of novel, halogen-free, environmentally safe, highly efficient fire-extinguishing powders based on local mineral raw materials which does not require modification with expensive, halogen-inclusive, hydrofobizing additives, providing low-cost production of fire-extinguishing powders in comparison with imported analogues. The optimal dispersity was selected in such way, that caking capacity is minimal and a homogeneous action of combustion products on the flame as well as a heterogeneous inhibition of combustion process must take place. The evaluation of powder efficiency is carried out with consideration of the both effects. Experimental data confirm that the developed fire-extinguishing powders are characterized with high performance characteristics, as well as high fire-extinguishing capacity. At the same time it should be noted that the efficiency of the obtained powders is practically the same as of standard imported powders, but do not contain any halogens, is environmentally safe and 1.5-2 times cheaper than the imported analogues. For obtained powders, the conditions of extinguish optimum and effective use of powder are stated. Optimum extinguishing condition means the selection of optimum intensity of powder supply into seat of fire when minimum consumption of powder provides fire extinguishing in minimum time. Thus, in order to determine optimum conditions of extinguishing it is necessary to study the dependence of powder specific consumption and extinguishing time to supply intensity. For our powders optimum condition of extinguish is the powder supply intensity I-0.6-1.0 kg/m2sec to fire center when powder specific consumption does not exceed G=0.8-1.2 kg/m2. Therefore, we can surmise that the use of fire-extinguishing powders of our preparation is possible at extinguishing of all types of fires over ground, as well as, underground constructions and does not need additional antiseptic measures.

Biography

Lali Gurchumelia is a Chemist, Doctor of Technical Sciences. She has worked with TSU Rafael Agladze Institute of Inorganic Chemistry and Electrochemistry (Georgia). Her research interests are in chemical science, chemical engineering, ecological engineering and ecological biotechnology. She has 55 publications, including in the infactactatorial journal-12. Currently she is the Manager of the grant# 216770- New type fire-extinguishing powders and foam-suspensions based on local mineral raw materials. She has also participated in many international conferences and congresses such as Nürnberg, Germany; Toledo, Spain; New Forest, UK; Montreal, Canada; Istanbul, Turkey; Elenite Holiday Village, Bulgaria; Rome, Italy; Paris, France; Yerevan-Vanadzor; Tbilisi, Georgia and Ureki, Georgia.

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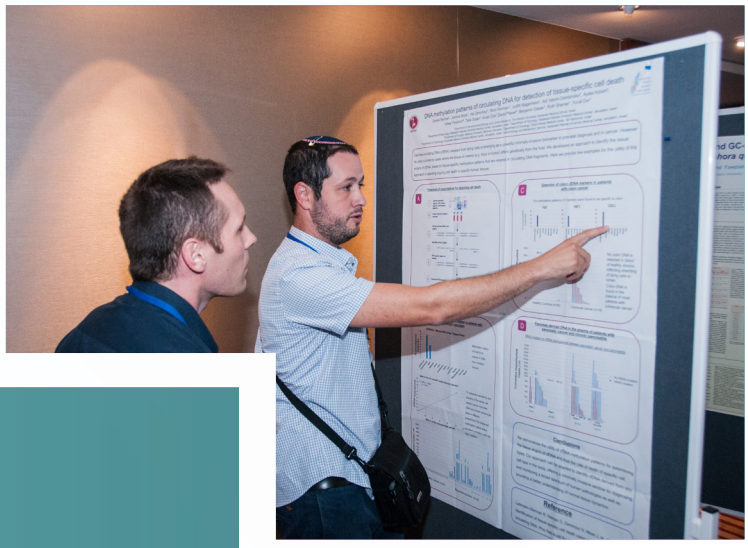

Scientific Tracks & Abstracts (Day 2)

Marina Zoccola et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C5-026

Superheated water hydrolysis of waste wool to obtain organic nitrogen fertilizers

Marina Zoccola[1], Raffaella Mossotti[1], Alessio Montarsolo[1], Alessia Patrucco[1], Rosalinda Caringella[1], Pier Davide Pozzo[1], Claudio Tonin[1] and Parag Bhavsar[2]
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A large amount of coarse wool, practically unserviceable for textile use, is generated in Europe from sheep shearing and butchery. Such a byproduct is dumped, burned or sent to landfill. Following the European Commission regulations on animal byproduct control, unserviceable raw wool is classified as category 3 special waste materials. The collection, storage, transport, treatment, use and disposal of such unserviceable raw wool are subject to European Union regulations because of a potential risk to human and animal health. This study aims at converting the waste wool into nitrogen fertilizers at a commercial scale for grassland management and cultivation purposes. The chemical transformation of waste wool in to fertilizer is based on a green economically sustainable hydrolysis treatment using superheated water. The experiments were carried out in a semi-industrial reactor feeding superheated water. The wool/superheated water system was maintained for different reaction times. The optimal conditions for this treatment were as follows: 170 °C for 60 minutes with a solid to liquor ratio close to 1. The hydrolyzed product was analyzed using amino acid analysis and molecular weight distribution. Both the amino acid and molecular weight distribution analysis revealed that the wool was completely degraded and the hydrolyzed product contains a low molecular weight proteins and amino acids. Several hydrolyzed product obtained at different conditions were tested for germination which showed a germination index higher than 100% without collateral phytotoxicity. The presence of amino acids, primary nutrients and micronutrients in wool hydrolyzates, along with a concentration of heavy metals below the standard limit confirms the possibility of using wool hydrolyzates as nitrogen based ecologically sound fertilizer.

Biography

Marina Zoccola has been working since 1989 as a Researcher at the National Research Council, Institute for Macromolecular Studies, textile section of Biella. Her principal interests are in the study and characterization of biopolymers, mainly structural proteins (wool, fine animal fibers, silk, human hair). She has participated in national and international research projects in the textile and biopolymer field. She is the author of over 30 scientific works published in international journals.

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Alessia Patrucco et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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Novel 3D keratin scaffold design for bone tissue engineering

Alessia Patrucco[1], Marina Zoccola[1], Rosalinda Caringella[1], Claudio Tonin[1], Nora Bloise[2], Lorenzo Fassina[2] and Livia Visai[2]
[1]CNR-ISMAC, Italy
[2]University of Pavia, Italy

In this research work novel 3D scaffold for bone tissue engineering have been produced, characterized and tested using an integrated bio-engineering approach, applying bio-mechanical stimuli generated by a Pulsed Electro-Magnetic Field (PEMF). Keratin 3D scaffolds, namely wool fibril sponges, were prepared by ultrasonic irradiation of wool fibers soaked in clean water, previously swollen in mild alkali. Casting the fibrils suspension produced microporous, biocomposite sponges, made of randomly oriented cortical cells stuck to each other by the hydrolyzed keratin matrix. Nevertheless, controlled-size salt-leaching allowed an additional 3D-tailored macro-porosity, with the aim of matching native bone features for cell proliferation and cell guided tissue formation. Sponges have been characterized for morphology, amino acid composition, thermal and mechanical behavior and *in vitro* ageing performances. In addition, osteoblast cell model (SAOS-2) was cultured onto 3D wool fibril sponge using an integrated bio-engineering approach, applying bio-mechanical stimuli of a PEMF. Mechanical properties of the wool fibril sponges come out in favor of promising applications as bio-absorbable scaffold for bone tissue engineering, since they are easy to handle and resilient in wet conditions. The integrated bio-engineering approach of applying bio-mechanical stimulus from PEMF, in addition to 3D architectural stimulus is given by 3D scaffolds, showed to be a successful solution. In fact, PEMF stimulated an earlier differentiation in osteogenic conditions, showing a perfect synergy between biochemical and mechanical stimuli in acceleration of the differentiation process. Finally, ageing tests revealed that wool fibril sponges, characterized by an exceptional amount of crosslinks that stabilize the keratin structure, are surpassingly stable, showing longer degradation rate compared to commercial collagen. In conclusion, biological, chemico-physical characterization and ageing tests suggest sponges are promising candidate for long term support of *in vivo* bone formation.

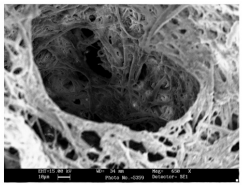

Figure 1: SEM observation of the keratin wool fibril sponge: detail of a pore morphology 650X.

Biography

Alessia Patrucco has completed her PhD in Bioengineering and Bioinformatics and her Master degree in Industrial Biotechnology from the University of Pavia. She is a Researcher at the Institute for Macromolecular Studies (ISMAC) of the Italian National Research Council since 2008. She has been cooperating to national and international research projects in textile and biopolymers field, fulfilling in some cases the role of project manager. She has also been a contract Professor Assistant of the course of textile fibers, internationals MSc in textile engineering at the Polytechnic of Turin and contract Professor in the international master management and textile engineering of the Carlo Cattaneo University.

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Meryem Kalkan Erdogan et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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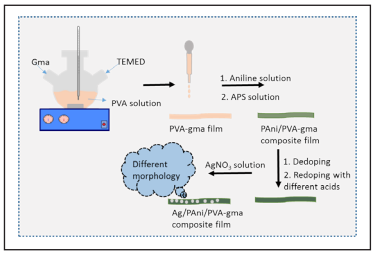
31ST MATERIALS SCIENCE AND ENGINEERING CONFERENCE: ADVANCEMENT & INNOVATIONS

October 15-17, 2018 Helsinki, Finland

Preparation of conductive polyaniline/metacryloyl modified-poly (vinyl alcohol) thin films and investigation of their usability in the reduction of morphologically different Ag particles

Meryem Kalkan Erdogan, Meral Karakisla and Mehmet Sacak
Ankara University, Turkey



One of the most electrically conductive conjugated polymers, polyaniline (PAni), has increasingly drawn the attention of the researchers due to its excellent tunable electrical properties and versatile functional groups such as amines and imines, which can form strong interactions such as H bonds with its composites. However, it's processing penalties such as being brittle when it is subjected to pellet form, difficult solubility in environmentally friendly solvents such water limit its usability in potential application areas. For this reason, many attempts have been made in literature. Among them, preparation of its films using soft commercial polymers such as poly(vinyl alcohol) (PVA) is promising in terms of imparting desired properties of the polymer such as high process ability, flexibility and hydrophility to the PAni, without losing its properties. In this work, we prepared a conductive composite film, from PAni and a methacryloyl groups introduced PVA polymer in a few facile steps. First, the PVA polymer was modified with glycidyl methacrylate in the presence of N,N,N,N-tetramethylethylenediamine (TEMED) as catalyst at 60 °C in DMSO and then casted as films. Second, aniline was polymerized on PVA-gma film surface with APS oxidant in 1M HCl. The effect of some conditions such as concentration of PVA-gma polymer (g/100 mL) and concentration of aniline (M) were investigated on PAni (%) content and surface resistivity of the film. It was observed that the surface resistivity of the thin and almost transparent PAni/PVA-gma films (containing 17.5% of PAni) reached to 1000 Ω/cm^2. The composite films were characterized with various techniques. The as-prepared films were used as soft templates in the reduction of Ag particles, after subjecting the films to the ammonia de-doping and different sulfonic acids re-doping processes. The changing morphology, particle size and decoration intensity of the Ag particles were also monitored with SEM technique.

Biography

Meryem Kalkan Erdogan is a Research Assistant in the Department of Chemistry, Faculty of Science, Ankara University. She has completed her MSc degree in 2011 and PhD degree in 2017, respectively. Her research interests are preparation of electrically conductive composites from conductive polymers with various materials such as textiles, developing materials for electromagnetic interference shielding and surface properties of noble metal nanoparticles.

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Yun Hee Lee et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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Utility of camphor as diluent for lithography-based ceramic 3D printing technique

Yun Hee Lee, Jung-Bin Lee and Young-Hag Koh
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This study demonstrates the utility of camphor as a novel type of diluents for the preparation of photo-curable ceramic slurries, which can have sufficiently low viscosities with high solid loadings (e.g., 48 vol %). These characteristics enable the use of conventional lithography-based Additive Manufacturing (AM) techniques without specifically designed feeding and recoating systems. To demonstrate this, Calcium Phosphate (CaP) ceramic objects and scaffolds were produced using various CaP slurries with different CaP contents (35 vol %, 40 vol %, 45 vol % and 48 vol %). The density and fracture strength of the samples after sintering at 1250 °C for 3 hours increased remarkably with an increase in solid loading from 35 vol % to 48 vol %. The curing behaviors (e.g., curing kinetics, cure depth and cure width) of a highly concentrated ceramic slurry (solid loading=48 vol %) were carefully characterized in order to achieve tightly controlled ceramic structures. Owing to these observations, porous CaP scaffolds with tailored porous structures could be successfully produced, where the porosity of ~54 vol %, pore size of 739.4 μm×702.5 μm in the x-y direction and wall thickness of ~1029 μm×903.7 μm were created. The porous CaP scaffolds showed the reasonably high compressive strength and modulus of ~30 MPa and ~299.45 MPa, respectively, which was attributed to the construction of highly densified CaP frameworks in a controlled periodic pattern. These findings suggest that camphor can be effectively used as the diluent, which can allow for the preparation of ceramic slurries with reasonably low viscosities and thus ceramic scaffolds with tailored porous structure can be produced using conventional lithography-based AM machine.

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Kholodkov N S et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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31ST MATERIALS SCIENCE AND ENGINEERING CONFERENCE: ADVANCEMENT & INNOVATIONS

October 15-17, 2018 Helsinki, Finland

Polymer composite with soft magnetic Fe-Co nano-powders obtained by cavitation method

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Composite materials consisting of magnetic particles in polymer matrix have a wide area of potential application. In most cases the alloy nano-powders are obtained by means of polyol method or ball milling technique. These fabrication methods are characterized by low cost efficiency, but need multi-stage production process. In addition, the magnetic properties of obtained nano-powders do not strictly correspond to alloy state characteristics. In the present report the new cost effective method of nano-powder production is provided. It is the cavitation destruction that allows obtaining various magnetic nanoparticles with good magnetic properties close to those of well-known solid-state alloys. Cavitation is the process of formation and collapsing of low pressure bubbles near the surface of quickly moving object in a liquid. The collapse of tiny bubbles produces the intense shockwave that knocks out small particles from the object's surface into liquid. Resonance piezo-ceramic vibrator has been used in home-made laboratory facility to provide cavitation process. $Fe_{73}Co_{27}$ nanoparticles with very high saturation magnetization were obtained in different liquids such as benzyl alcohol, methyl methacrylate and water. Rather narrow particle size distributions not exceeded 18% were obtained in all liquids studied. It is found that the average particle size strictly depends on the liquid viscosity. It is given by 475 nm in methyl methacrylate, 196 nm in benzyl alcohol and 80 nm in water, respectively. Magnetic properties of 475 nm $Fe_{73}Co_{27}$ particles in polymeric matrix were investigated. In the fields of approximately 4 kOe composite were almost saturated, and full saturation was achieved in fields not exceeded 6 kOe. The highest saturation magnetization for this composite was equaled M_s=245.3 emu/g. Using cheap $Fe_{70}Co_{27}$ nano-powders with high saturation magnetization and small coercive force allows us to reduce the total amount of powder in polymer composite showing increased heating efficiency in alternating magnetic field. These magnetic particles are promising for biomedical applications, in particular, for hyperthermia treatment.

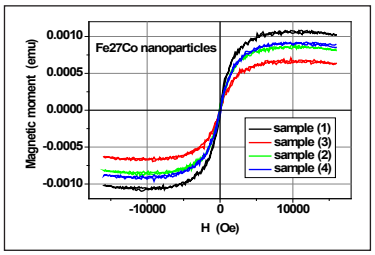

Figure-1: Hysteresis loops of the $Fe_{73}Co_{27}$ particles of 475 nm in size obtained in methyl metacrylate.

Biography

Kholodkov N S has completed his Master's degree in Material Science and Technologies from Moscow University of Steel and Alloys. He has worked in the field of magnetic measurements of weak magnetic fields produced by corrosion currents. Currently, he is a PhD student of NUST "MISiS" and is working with soft magnetic powders.

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Notes:

Kaustav B Arya, Res. Rev. J Mat. Sci. 2018, Volume 6
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Naval vest

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Life vests are the most reliable suits during water emergencies, such as boating, swimming (in case of non-swimmers), etc. But I have found some deadly errors in common life vests. To overcome this problem, I have observed the problems of common life vests and made the naval vest without any problem. My objective was to make new generation multipurpose and more efficient life vest. After my research, I have found a special polymer. I have used this special material in my innovation. This is expanded polyethylene which is made of petroleum. It is a hydrocarbon {(C2H4)n}. The density of this polyethylene is very less, even less than water. The capillarity of this material is nil. That is why it does not absorb water even after being in it for a long time. For these specialties it is more suitable for naval vest than any other material. To make this vest, this material is dressed up with non-permeable synthetic nylon cloth. Additionally I have attached one pair of hand gloves made of synthetic nylon cloth over the vest. Now I can claim that this vest will create its own space among people and it will contribute something valuable in the field of sustainable development by saving lives of mankind.

The novelty in present naval vest

- Floats on water even after receiving damage.
- Includes hand gloves with no space between two fingers, so that the sufferer will be able to swim in huge waves with ease.
- Cost effective and affordable.
- Easy to carry.
- Use of eco-friendly materials for a sustainable globe.

Materials used

- Expanded polyethylene (EPE Foam)
- Synthetic nylon clothes
- Thread
- Glue

Biography

Kaustav B. Arya was Former child scientist of national children's science congress-2017. He is Member of American Physical Society and currently undergoing research in different innovations in material science associated with Institute of Advanced Study In Science and Technology, India.

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Igor Tkachenko et al., Res. Rev. J Mat. Sci. 2018, Volume 6
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Some features of the ductile and gray iron microstructures providing increase of their impact resistance

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Low impact resistance of the ductile and especially gray irons is well known problem of their performance. Commonly accepted statements concerned with the problem are dominant graphite particle morphology ill effect on the resistance and impossibility to improve the morphology by means of any type of heat treatment. Aim of the report is to outline basic microstructure features for the above industrial pearlite matrix irons in their states with high impact resistance provided by developed novel heat treatment. The treatment comprised typical austenitizing, 2-7 hours isothermal holding at 600-900 °C during cooling or heating and final air-cooling. The ménage impact tests were conducted at room temperature. The results obtained showed considerable increase in the impact strength of both the above optimally heat treated irons (up to KCU~550 kJ/m^2) comparing with their conventionally normalized states: KCU ~ 65 kJ/m2 and ~ 20 kJ/m2, respectively, for the gray and ductile iron. The revealed performance improvements are attributed to the phase transformations preferable development on the hetero-phase interfaces with further cementite decomposition and initial graphite particle partial solution among the ferrite fine grain surroundings. Initial and resulted microstructures of the investigated irons are shown on the figures.

Biography

Igor Tkachenko is Doctor of Technical Science (DSC (Eng)), Professor of Material Science Department of Priazovsky State Technical University (Mariupol, Ukraine). He has over 30 year experience in improving quality and reliability of bulk structural alloy steel industrial products for demanding applications.

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Notes:

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Preparation and evaluation of poly [2-amino-4(1-benzyl-1H-indol-3-yl) thiophene-3-carbonitrile)] as corrosion inhibitor of C-steel in the acidic medium

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The inhibition performance of poly[2-amino-4(1-benzyl-1H-indol-3-yl) thiophene-3-carbonitrile)] as a new polymer has been investigated for carbon-steel in 0.5 M H_2SO_4. The polymer is synthesized at different molecular weight. Notably, gives high inhibition efficiency even at low concentration. The corrosion inhibition capability of the polymer is due to the adsorption of its function groups at the C-steel surface. The conjugation resulted from the indole/thiophene ring play an important role for improvement the inhibition efficiency. The structure of polymer had been approved by NMR and IR. The type of adsorption of the polymer was elucidated by different adsorption isotherms. FTIR analysis was performed to confirm the adsorption between the polymer and C-steel surface. The morphological changes on the surface of steel were monitored by Scanning Electron Microscopy (SEM).

Biography

Rasha Abdel Baseer is a Researcher of Polymer Technology in National Research Centre, Egypt.

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