



Photo essay

7. Memories of the Worldwide Congress on Materials and Manufacturing Engineering and Technology COMMENT'2009, 14th-17th June 2009 in Gliwice – Gdańsk, Poland

The Organising Committee of the COMMENT'2009 Congress



Materials

16. Polymer matrix composite materials reinforced by $Tb_{0.3}Dy_{0.7}Fe_{1.9}$ magnetostrictive particles
L.A. Dobrzański, A. Tomiczek, B. Tomiczek, A. Ślawska-Waniewska, O. Iesenchuk (Poland)



Properties

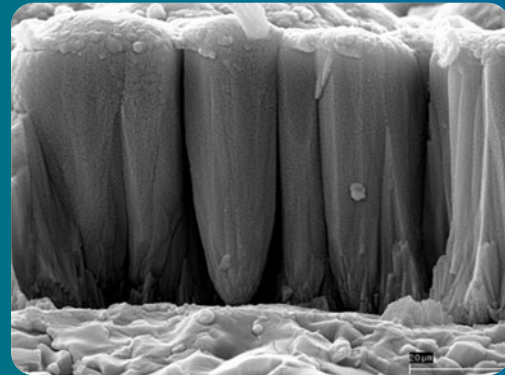
24. Study of the relaxor behaviour in $Ba_{0.68}Na_{0.32}Ti_{0.68}Nb_{0.32}O_3$ ceramic
W. Bąk (Poland)
28. Influence of cooling rates on properties of pre-alloyed PM materials
L.A. Dobrzański, M. Muszyfaga (Poland)
36. Structure and mechanical properties of PVD gradient coatings deposited onto tool steels and sialon tool ceramics
L.A. Dobrzański, M. Staszuk (Poland), A. Kříž (Czech Republic), K. Lukaszowicz (Poland)
44. Relaxor phase transition of polycrystalline $(Ba_{0.90}Sr_{0.10})(Ti_{0.75}Sn_{0.25})O_3$
C. Kajtoch (Poland)



Methodology of research

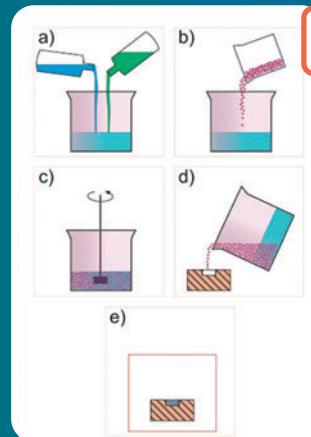
48. FEM-based verification of the PN-EN standard-based stress concentration factor for the drum-pipe joint of a boiler
R. Dwornicka (Poland)

Selected materialographical photo



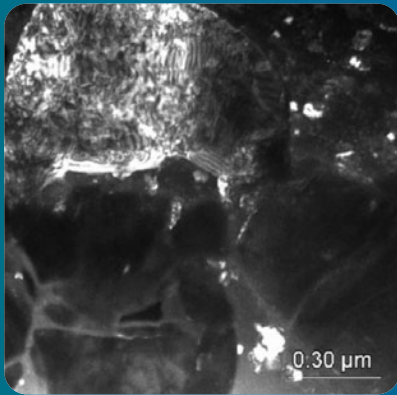
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The research paper entitled "Structure and mechanical properties of PVD gradient coatings deposited onto tool steels and sialon tool ceramics" by L.A. Dobrzański, M. Staszuk, A. Kříž and K. Lukaszowicz on a **page 36** describes the investigation results of the structure and mechanical properties of gradient coatings deposited by cathodic arc evaporation – physical vapour deposition (CAE-PVD) techniques onto the X40CrMoV5-1 hot work tool steel, HS6-5-2 high speed steel and SiAlON tool ceramics. The Ti(C, N), (Ti, Al) N and (Al, Si, Cr) N coatings were investigated. Microstructure was characterised using scanning and transmission electron microscopy. The phase composition of the investigated coatings was determined by means of the X-ray diffractometer. The chemical concentration changes of the coating components, and the substrate material were evaluated in virtue of tests carried out in the GDOS spectrometer. Tests of the coatings' adhesion to the substrate material were made using the scratch test method. It was found out that the structure of the PVD coatings deposited onto all substrates is composed of fine crystallites. The investigations made by use of the glow discharge optical emission spectrometer indicate the existence of the transition zone between the substrate material and the coating. The results show that all coatings present good adhesion. Working out and testing PVD coatings obtained by tool ceramic and tool steels is a special feature of development direction in a domain of thin coatings.



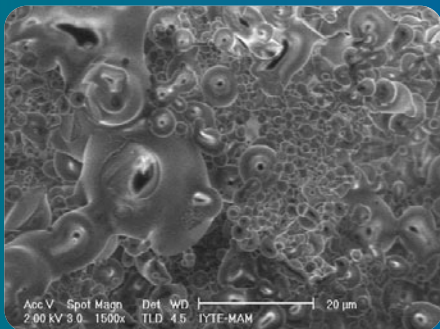
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The paper written by L.A. Dobrzański, A. Tomiczek, B. Tomiczek, A. Ślawska-Waniewska and O. Iesenchuk on "Polymer matrix composite materials reinforced by $Tb_{0.3}Dy_{0.7}Fe_{1.9}$ magnetostrictive particles" on a **page 16** discusses a manufacturing process of polymer matrix composite materials reinforced by $Tb_{0.3}Dy_{0.7}Fe_{1.9}$ particles and observes changes of physical properties (magnetic properties and magnetostriction) of samples with randomly oriented magnetostrictive particles in epoxy matrix and with aligning these particles in the matrix during fabrication process. The originality of this work is based on manufacturing process, especially of applying magnetic alignment for ordering $Tb_{0.3}Dy_{0.7}Fe_{1.9}$ particles during polymerisation of epoxy matrix. The advantages of the epoxy matrix magnetostrictive composite materials are their simple technology and lower manufacturing cost in comparison to the monolithic $Tb_{0.3}Dy_{0.7}Fe_{1.9}$. Composite materials examined in this study possess a good magnetostrictive response; nevertheless, further tests should be carried out in order to examine the influence of $Tb_{0.3}Dy_{0.7}Fe_{1.9}$ particle size on the magnetostrictive and magnetic properties. Demagnetisation effect should be also considered. For potential applications in technological devices, such as sensors and actuators, it is desirable to form composite systems by combining magnetostrictive phases with matrix, in order to have giant magnetostrictive effect and, at the same time, to reduce disadvantages of monolithic material. In this paper it was proved that oriented polymer matrix composite materials reinforced by $Tb_{0.3}Dy_{0.7}Fe_{1.9}$ magnetostrictive particles offer better performance than those non-oriented.



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The paper entitled "Effect of laser treatment on microstructure and properties of cast magnesium alloys" by L.A. Dobrzański, J. Domagała-Dubiel, K. Labisz, E. Hajduczek and A. Klimpel on a **page 57** shows the structure and properties of the cast magnesium alloy after laser treatment. In this research two powders (WC and TiC) with the particle size over $5\mu\text{m}$ were used. This investigation presents different laser power by one process speed rates. The laser treatment of magnesium alloys with TiC, WC powders was carried out using a high power diode laser (HDPL). The resulting microstructure in the modified surface layer was examined using optical microscopy, scanning electron microscopy and transmission electron microscope. Phase composition was determined by the X-ray diffraction method using the XPert device. The measurements of hardness and wear resistance of the modified surface layer were also studied. The originality of this work is the application of High Power Diode Laser for alloying of magnesium alloy using hard particles like tungsten and titanium carbides.



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The paper from Manufacturing and processing area made by G. Genç, G. Narin and O. Bayraktar on "Spray drying as a method of producing silk sericin powders" on a **page 78** describes spray drying as a method of producing silk sericin powders. Aqueous sericin solutions were used as raw material for the production of dry powders using a lab-scale spray dryer. A linear regression analysis of agglomeration was employed, in addition to experimental designs at two levels with three factors for the analysis of three responses: moisture content, particle type and agglomeration degree. The process factors were the drying air temperature (120°C and 160°C), the feed rate (1.25×10^{-7} and $2.5 \times 10^{-7} \text{ m}^3/\text{s}$), and the concentration of sericin solutions of 10% and 30% (w/w) fed to the spray dryer. As a result of the growing interest in drug delivery through a pulmonary route for local and systemic effects, the crucial physical characteristics of the spray-dried sericin influencing the dispersion and deposition behaviour including particle size, morphology, moisture content and agglomeration degree were examined for formulation and spray drying variables. The most effective parameters on particle size and morphology were found to be the feed solution concentration and feed rate, while the temperature was an insignificant variable.



Analysis and modelling

52. Cooperating agents approach to task execution planning
J. Madejski (Poland)



Manufacturing and processing

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L.A. Dobrzański, J. Domagała-Dubiel, K. Labisz, E. Hajduczek, A. Klimpel (Poland)
65. Effect of cooling rate on the solidification behaviour of MC MgAl6Zn1 alloy
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