

Preparation and properties of conductive polyimide nanocomposites with assistance of a metallo-organic compound

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Highly reflective and electrical conductive polyimide films have been developed by incorporation of surface modified silver flakes and a metallo-organic compound, silver 2-ethylhexanoate, into a polyimide matrix. The surface conductivity can be obtained during the imidization process of polyimide, because the metallo-organic compound can decompose into silver atoms at a low temperature of 150°C. The optimum weight ratio of silver 2-ethylhexanoate to silver flakes was 2/8, and the surface resistivity of the conductive polyimide film, which contained 30 wt% of silver fillers, was 10^{-2} ohm sq^{-1} . The metallized films had excellent thermal properties. Their glass transition temperatures were above 276°C, and the thermal decomposition temperatures were over 512°C. The optical reflectivity of the films was up to 90%.

Biography

Steve Lien-Chung Hsu is currently a Professor at the Department of Materials Science and Engineering of National Cheng-Kung University, Taiwan. He obtained his Ph.D. in Polymer Science from the University of Akron (Ohio, USA) in 1991. He joined the faculty at National Cheng-Kung University, Taiwan in 2000 as an Assistant Professor, where he was promoted to Associate Professor in 2003 and full Professor in 2006. He has published over 70 peer-reviewed papers and holds 15 US patents.

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Intermittent plastic response in microcrystals and bulk metallic glasses

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When a physical system, under slowly increasing external stress, responds through impulsive events, there is commonly a regime where avalanches cluster in time and oscillatory "stick-slip" response is observed. The traditional explanation for such phenomena has to do with a microscopic stick-slip effect due to increasing friction at material contacts. However, several systems, among them plastically deformed microcrystals and bulk metallic glasses, develop oscillatory response as collective stress relaxation channels proliferate but with no apparent connection to friction-if can be defined-or other microscopic, "friction"-inspired effects. In this talk, I will present a novel universal mechanism for the emergence of oscillatory response in such systems, the self-organized avalanche oscillator. This is a novel critical state exhibiting oscillatory approaches toward an interface depinning critical point. While the theory is general enough to be applicable to all aforementioned phenomena, I will demonstrate how its predictions are faithfully exhibited in a thorough experimental investigation of slowly compressed Ni microcrystals, where unconventional quasi-periodic plastic bursts and higher critical exponents are observed while the nominal strain rate is decreased. Further, I will discuss a novel model for avalanches in bulk metallic glasses and present predictions for future.

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Characterization of the boride layers formed on C38 steel by pack-boriding

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This present work investigates the effect of the time duration on the boriding kinetics of C38 steel. The pack-boriding treatment was carried out at 1000°C for 0.5, 1, 2, 4 and 8 h using a powdery mixture consisting of 5% B_4C , 5% NaBF_4 and 90% SiC . The boride layers were characterized by the following experimental techniques: (Scanning electron microscopy, X-ray diffraction analysis Vickers micro hardness tester and measurement of the mass gain). The observations by scanning electron microscope revealed that the Fe_2B layer was formed after a short time (0.5 or 1 h). The boride layers were composed of FeB and Fe_2B phases for a treatment time exceeding 2 h. The surface roughness of the borided samples was increased with the boriding time. The mass gain due to the boriding was investigated and its evolution was described by a parabolic law. In addition, the experimental boride layer thicknesses were compared to those predicted by the diffusion model. A good agreement was obtained between the simulation results and the model results. Finally, contour plots that describe the evolution of the boride layers formed on the borided C38 steel were established. The iso-thickness diagrams can be used as a tool to select the boride layer thickness in relation with its practical use.

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