MRS JOURNAL HIGHLIGHTS

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Air driven electrospinning of CNT-doped conductive polymer fibers for electronics

Emily A. Kooistra-Manning, Lane G. Huston, Jack L. Skinner, Jessica M. Andriolo

The authors present an electrostatic and air driven system and technique to improve the electric conductivity of poly(ethylene oxide) fiber nonwoven mats that are spun using a recently developed device. The ability and flexibility to deposit electrically conductive polymer fibers with controlled sizes on any sort of three-dimensional object provides opportunities for a wide range of applications, from health care to catalysis. doi.org/10.1557/adv.2020.337

Growth of monolayer MoS_2 on hydrophobic substrates as a novel and feasible method to prevent the ambient degradation of monolayer MoS_2

Kevin Yao, Dave Banerjee, John D. Femi-Oyetoro, Evan Hathaway, Yan Jiang, Brian Squires, Daniel C. Jones, Arup Neogi, Jingbiao Cui, Usha Philipose, Aryan Agarwal, Ernest Lu, Steven Yao, Mihir Khare, Ibikunle A. Ojo, Gage Marshall, Jose Perez

Materials research is often carried out in ambient environments, and exposure to air is a crucial aspect of the loss of performance for 2D materials. In this work the authors demonstrate growth on a hydrophobic substrate (silicon nitride versus silicon oxide), significantly reducing the effects of exposure to ambient conditions on this particular material, which may indicate important directions to enhancing research productivity in typical laboratory conditions. doi.org/10.1557/adv.2020.292

Recycling of plastic waste materials: Mechanical properties and implications for road construction

J.A. Panashe, Y. Danyuo

While a circular economy would allow for closed-loop recycling, in many areas of the world this is still a long-term goal. The authors approach plastic waste in a second-use application to alter the properties of construction materials, quantifying the performance of adding poly(ethylene tetraphylate) to asphalt for roadways in their region. Improved performance is observed in laboratory-scale studies, as well as increased time to handle the construction materials. A current field trial is being evaluated. doi.org/10.1557/adv.2020.197

Biocompatibility of a novel heat-treated and ceramic-coated magnesium alloy (Mg-1.2Zn-0.5Ca-0.5Mn) for resorbable skeletal fixation devices

Agnieszka Chmielewska, Taylor MacDonald, Hamdy Ibrahim, Tim McManus, Jan Lammel Lindemann, Patrick Smith, Lihan Rong, Alan Luo, Rigoberto Advincula, Wojciech Swieszkowski, Mohammad Elahinia, David Dean

The authors highlight the use of resorbable and degradable Mg alloys used for bioimplants. The controlled degradation is important in osseointegration and natural bone growth. This was achieved in this work by controlled alloying and coatings. doi.org/10.1557/mrc.2020.46

Synthesis of self-assembled siloxane–polyindole–gold nanoparticle polymeric nanofluid for biomedical membranes

Prem C. Pandey, Naman Katyal, Govind Pandey, Roger J. Narayan

The authors highlight the use of gold nanoparticle assemblies in microfluidic and nanofluidic functions for sensor development in order to achieve high sensitivity. The hybrid nature of the materials enables fixation and future chemistries involving silane and polyindole compositions. doi.org/10.1557/mrc.2020.50

Towards biomimetic electronics that emulate cells

Claudia Lubrano, Giovanni Maria Matrone, Csaba Forro, Zeinab Jahed, Andreas Offenhaeusser, Alberto Salleo, Bianxiao Cui, Francesca Santoro

The authors offer a Prospective on bioelectronics design and applications with emphasis on cell-chip interfacing. The unique challenge coupling of living cells depends on chemical cues and morphological enhancement that results in high signal/noise ratio and stable transduction. doi.org/10.1557/mrc.2020.56

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