



A novel Iron(III)-based MOF: Synthesis, characterization, biological, and antimicrobial activity study

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Increased antimicrobial drug resistance led the authors to develop a new, effective metal-organic framework (MOF) for antimicrobial drugs with extended action time, multi-antimicrobial agents, low toxicity, and safe strategies. A novel affordable Fe(III)-MOF was simply prepared via a reflux method, which showed, under optimum conditions, excellent antimicrobial efficiency against positive/negative bacteria, fungus, and yeast. The results open the door for the use of prepared materials as an effective and efficient antimicrobial agent. <https://doi.org/10.1557/s43578-022-00644-9>

Predicting mechanical fields near cracks using a progressive transformer diffusion model and exploration of generalization capacity

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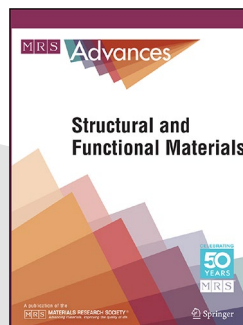
The author reports a deep learning method to predict high-resolution stress fields from material microstructures, using a novel class of progressive attention-based transformer diffusion models. The model, trained with data from molecular dynamics simulations, accurately predicted distinct fracture scenarios. The results indicate that exciting opportunities lie ahead in using progressive transformer diffusion models in the physical sciences to produce high-fidelity and high-resolution field images. <https://doi.org/10.1557/s43578-023-00892-3>

Recent advances in nitrogen-doped graphene oxide nanomaterials: Synthesis and applications in energy storage, sensor electrochemical applications and water treatment

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The authors review advances in production techniques, properties, and applications of nitrogen-doped graphene oxide (NGO). Variation in chemical composition, bonding configurations, and chemical reactive functionalities allow tunable properties that render NGO a suitable material for applications such as lithium-ion batteries, biosensors, supercapacitors, and adsorption processes. The type of C-N bonding and surface chemistries on the NGO are responsible for their unique electrical, mechanical, adsorption, chemical reactivity, photocatalytic activity, and optical properties. <https://doi.org/10.1557/s43578-023-01070-1>



Investigating the dielectric constant of barium titanate in a polymer-matrix nanocomposite

E. Cooper, E. De Anda, E. Flitz, H. Kim, N. Casañas, L. Johnson, Z. Kedzierski, J. Domrzalski, A. Dato, T. Monson

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The authors investigate the dielectric constant of barium titanate (BTO) nanoparticles with arrange of diameters. It was relatively constant at nanoparticle diameters as small as 200 nm but sharply declined at smaller nanoparticle sizes. These results will be useful in the development of improved energy storage and power conditioning systems utilizing BTO nanoparticles. <https://doi.org/10.1557/s43580-022-00319-x>

Silk fibroin molecularly imprinted nanoparticles as biocompatible molecular nanotraps: Molecular recognition ties the knot with biomaterials. The bioMIP's labeling and degradation

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The authors formed molecularly imprinted nanoparticles starting from biomaterials, under the name of bioMIPs, as a strategy to promptly translate them into clinical settings. Silk fibroin, a biocompatible and nonimmunogenic natural material, was used as a building block for the synthesis of bioMIPs tailored to recognize the protein human serum albumin. BioMIPs confirmed high selectivity and specificity for the targeted protein, together with cytocompatibility. <https://doi.org/10.1557/s43580-023-00507-3>

Impact of electrode materials on the performance of amorphous IGZO thin-film transistors

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The author reports on the fabrication and characterization of thin-film transistors (TFTs) based on indium-gallium-zinc-oxide (IGZO) with various source- and drain-region metals (Pt, W, and Ti). There is an influence of the source- and drain-electrode material on the maximum saturation mobility and inverse subthreshold slope. <https://doi.org/10.1557/s43580-022-00298-z>