



Effect of triazine polymers on mechanical properties of oil and gas wells cement

Hasmukh A. Patel, Kenneth D. Johnson, Roland F. Martinez

Smart materials and additives for the oil and gas industry are needed to enhance productivity and improve the completion time of wells. The authors discuss the use of triazine-based polymers to enhance the formation of covalent linkages in cement and polymers for improved mechanical properties in oil and gas wells cementing. Long-term stability during production and mitigating-failure are important for the industry. <https://doi.org/10.1557/s43579-022-00316-z>

Effect of graphite content on the microstructure and mechanical properties of Al₅SiC-xC_{gr} hybrid composites produced by powder metallurgy

Anna Wąsik, Beata Leszczyńska-Madej, Marcin Madej

The authors discuss high-performance metal alloys based on careful studies of morphology, crystallinity, and composition. The use of graphite in aluminum composites enhances the domains and microstructure to improve mechanical properties. Imaging by SEM analysis can reveal both abrasive and adhesive traction for predicting failure. <https://doi.org/10.1557/s43579-023-00322-9>

4D scanning transmission electron microscopy (4D-STEM) reveals crystallization mechanisms of organic semiconductors on graphene

Zixuan Guo, Colin Ophus, Karen C. Bustillo, Ryan Fair, Stefan C.B. Mannsfeld, Alejandro L. Briseno, Enrique D. Gomez

The authors' investigation of molecular packing at organic-organic interfaces is important for designing new organic and hybrid semiconductor materials. They use STEM methods to observe orientation and order in graphitic surfaces, which is crucial for device operation and reliability. This is also important for understanding interlayer charge and energy transport in bulk heterojunction devices. <https://doi.org/10.1557/s43579-022-00310-5>

Recent advances in cathode materials for aqueous zinc-ion batteries: Mechanisms, materials, challenges, and opportunities

Sanna Gull, Han-Yi Chen

The authors provide a concise overview of the fundamental and recent developments and challenges in cathode materials for aqueous zinc-ion batteries. Several types of cathode materials are categorized and discussed in terms of their structural and electrochemical performance, challenges, and approaches to enhance their electrochemical performance. <https://doi.org/10.1557/s43581-022-00044-w>

Greener reactants, renewable energies and environmental impact mitigation strategies in pyrometallurgical processes: A review

Jean-Philippe Harvey, William Courchesne, Minh Duc Vo, Kentaro Oishi, Christian Robelin, Ugo Mahue, Philippe Leclerc, Alexandre Al-Haik

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The authors present an overview of the different approaches to use renewable energies and valorize residual heat in pyrometallurgical units to produce metals and alloys. Strategies to mitigate environmental impacts of pyrometallurgical operations such as CO₂ capture utilization and storage are discussed, as well as gas scrubbing technologies. <https://doi.org/10.1557/s43581-022-00042-y>

A study on various sources and technologies for production of biodiesel and its efficiency

Pulkit Kharia, Ritesh Saini, Vamsi Krishna Kudapa

The authors examine biodiesel environmental assessment principles and current accomplishments and take into account all the variables that can affect process efficiency and safety. The scope covers biodiesel generation from micro-algal lipids and enhanced homogeneous and enzymatic transesterification, as well as non-catalytic supercritical transesterification using microwave and ultrasound as helping technologies. <https://doi.org/10.1557/s43581-022-00058-4>