ISSN: 0973-3469, Vol.20, No.(1) 2023, Pg.01-02

Material Science Research India

www.materialsciencejournal.org

# Editorial

**NINI ROSE MATHEWS**

Instituto De Energías Renovables Universidad Nacional Autónoma De México.

**Article History**

Published on: 08 May 2023

The articles carefully selected for this issue is in line with the aims and scope of the journal, which is promoting the design, optimization and discovery in new solid materials. The materials of interest include but not limited to, ceramics, polymers, semiconductors, magnetic materials, biological and medical materials, and nanomaterial. The highlights of this issue include: (i) articles on the practical applications of certain semiconductors from the perspective of both theoretical and experimental side, (ii) discussion on composite materials based on graphene and carbon nanotubes.

In harvesting solar energy through photovoltaic technology, the tandem solar cells are a key component which demonstrated a leading role in both terrestrial and space applications. With the evolution of perovskite materials and the ongoing revolution it generated in all frontiers of material science and engineering, photovoltaic technology is in a new era pushing the limits of device performance. The solar materials discussed in this issue are cadmium oxide, indium oxide, cadmium indate, and perovskite. Although perovskite is the main absorber material, oxide materials are key components in the development of passive layers in a photovoltaic device. The article on the perovskite-Si hybrid tandem solar cell highlights the material features such as light absorption potential, long carrier diffusion length and fast charge separation process of both top- and bottom-cell materials. Another advantage of perovskite is the widely tunable band gap and the semitransparency, making it ideal for top-cell fabrication. Functionally graded AlSi/MWCNT composite material is of interest since it can provide certain reinforcement. Most of the studies are focused on axially layered structure due to the ease of fabrication, however, the full advantage of this composite material is harvested only when proper designs are implemented. One of the articles in this issue discuss the functionally graded AlSi/MWCNT cylinders produced with 2wt% MWCNT at the outer surface to provide a complex and wear-resistant surface. The interior surface is soft with AlSi to provide elasticity. The resulting samples showed 112% and 11% increase in maximum tensile strength compared to AlSi and 1 wt% AlSi-MWCNT. Similarly, the compressive strength is also significantly higher for the 2wt%

**CONTACT** Nini Rose Mathews nrm@ier.unam.mx Instituto De Energías Renovables Universidad Nacional Autónoma De México.


Doi: http://dx.doi.org/10.13005/msri/200101

MWCNT sample. There is a proper bond between the inner and outer layers, which was demonstrated by the tensile, compressive, and hardness properties. On a totally different front, another article in this issue presents carbon-based materials in decontamination of water. Adsorption is considered as a viable method for the removal of heavy metal ions from an aqueous solution, however, the synthesis of adsorbents with desired selectivity and performance remains a key challenge. In this work, different absorbents based on graphene oxide and the composites with titanium dioxide were studied. The magnetic graphene oxide has the highest BET surface area of about 108.375 m2/g, indicating that the prepared nanomaterials may effectively adsorb the heavy metal ions from an aqueous solution. We have included a review article on the application of calcium hexaferrite as a microwave absorbing material. The focus is on the M-type (Ca, Sr, Ba) hexa-ferrites with a space group of P63/mmc that were synthesized using various techniques and characterized by XRD for crystallographic information, SEM and TEM for surface morphology, VSM for magnetic behavior, and vector network analyzer for microwave absorption properties. This review paper investigates how the changes in chemical composition of a material affect the features such as coercivity, saturation magnetization, and Curie temperature, as well as managing these properties and utilizing these compounds in the field of microwave absorption properties and magnetic field industry.