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Editorial: Women in nanotechnology: Vol. I

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Editorial on the Research Topic
Women in nanotechnology: Vol. I

Introduction

This Research Topic in Frontiers in Nanotechnology was honored to provide this platform to encourage the work of women scientists in all nanotechnology-related fields. We believe that the studies displayed here highlight the variety of research executed within the entire scale of the nanotechnology areas and portray innovations in hypothesis, experimentation, and methodology with applications to lean on problems.

This unique volume features nine articles authored by 43 researchers, indicating high attention and engagement in the field. The research volume includes diverse studies at the forefront of nanotechnology, each offering unique insights and contributions to the field in various domains (Figure 1).

Eco-friendly synthesis of nanoparticles

The volume opens up with a novel investigation by Sergievskaya et al. on the environmental-friendly synthesis of stable colloidal gold nanoparticles utilizing magnetron sputter deposition onto castor oil through varying parameters, for instance, sputter power, deposition time, gas pressure, and plasma type. This innovative method underlines the merit of sustainable nanotechnology systems and vegetable oils' ability to fabricate nanoparticles.

In other work, Campaña et al. also emphasize the benefit of a green, economical, and nature-friendly process with promises of microorganism-facilitated production of metal nanoparticles (MNPs). Their broad review examines the complex mechanisms bacteria use to uptake and moderate metal ions, featuring the ability of microbial synthesis to generate high-end MNPs appropriate for distinct purposes. In contrast, challenges, such as polydispersity and modest yield, endure, and enhancing growth environments and purification practices propose possibilities for development. Most importantly, this work highlights the extensive industrial promise and features the significance of continuing research in comprehensive microbial redox action and metal transport for remote advancements in this field.

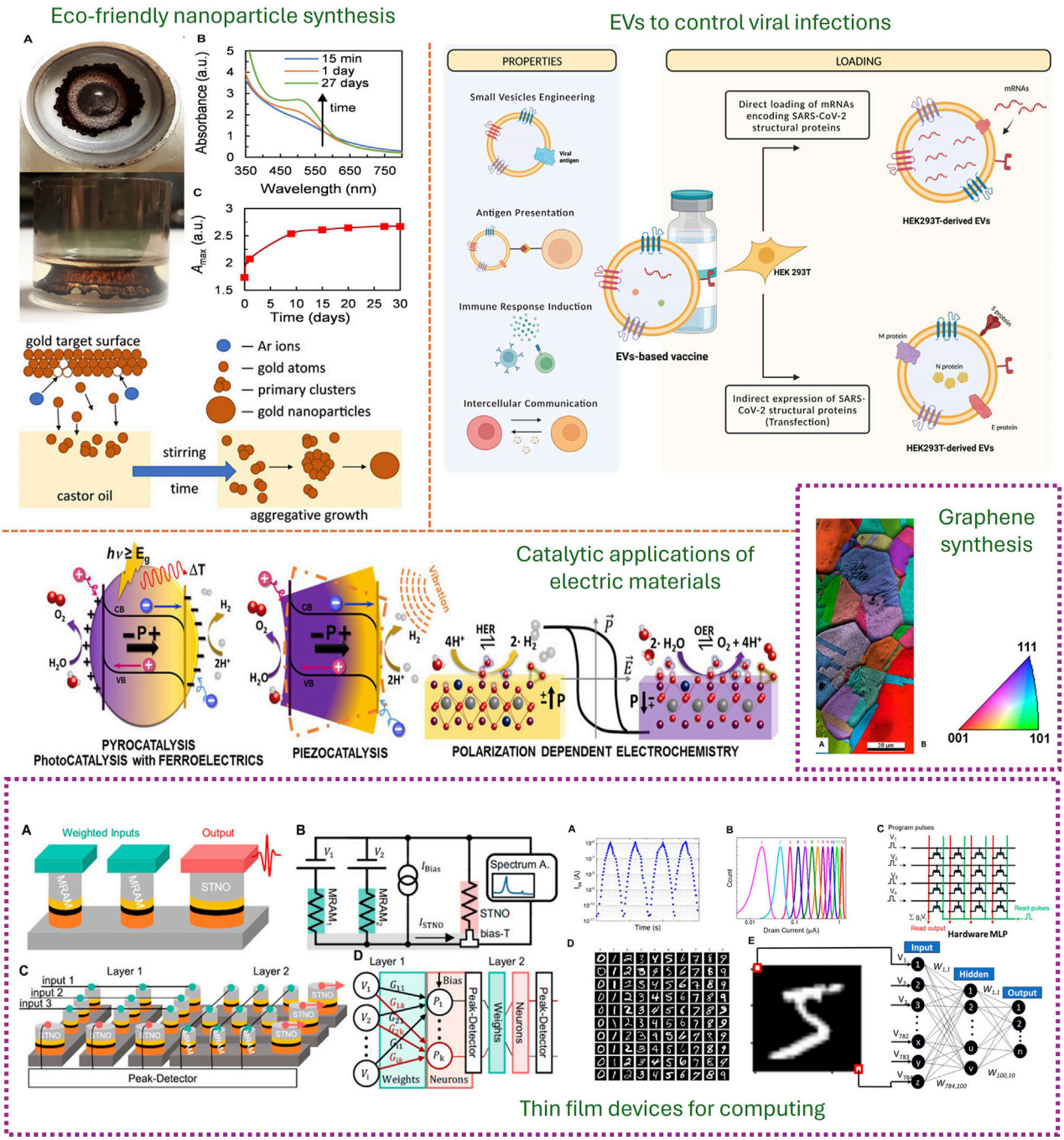

FIGURE 1
Glances of some studies published in this research volume.

Role of extracellular vesicles to combat viral infections

Regarding the past pandemic, the fundamental function of extracellular vesicles (EVs) in intercellular communication, especially in the settings of coronavirus infections, has been explored by Sbarigia et al. In this detailed review, their in-depth assessment glances at EVs' capability as SARS-CoV-2 diagnostic and therapeutic tools alongside observing EVs' functions in immune escape, virus entry, and duplication. Their effort explains the fabrication of EVs, their structural resemblance to viruses, and their competence to persuade immune functions. On the other hand, EV heterogeneity's obstacles and their suggested purposes in therapies and diagnostics emphasize the requirement for additional consideration to improve our understanding and clinical expenditures of EVs.

Advanced relevance of thermoresponsive polymers

Hopkins et al. studied the thermoresponsive characteristics of polymers, for example, poly (N, N-diethylacrylamide) (PDEA) and poly (N-isopropylacrylamide) (PNIPAM), identifying their implications in biomedical as well as industrial domains. Their work delves into the coil-to-globule modification of these polymers in diverse solvents, revealing glycerol's capability to reach elevated minimal critical solution temperatures, sustaining the potential for industrial products. Employing simulations, this research supplies worthy perceptions into polymer performance, placing the grounds for forthcoming biosensing, water treatment, drug delivery, etc.

Catalytic applications of electric materials

Domingo researched the developing application of ferroelectric and piezoelectric materials in catalytic perspectives. Pointing out the impact of identifying process time range, this work supports developing innovative characterization equipment to drive piezo catalyst design forward. Although existing concentrations predominantly aim for pollutant refinement, this study emphasizes the requirement for additional studies to improve the decrease of CO_2 and water-splitting productivity. These advancements hold promise for catalyzing progress in energy harvesting and biomedical applications.

Graphene synthesis

Grubišić-Čabo et al. discovered the influence of calcium intercalation in quasi-freestanding bilayer graphene on silicon carbide (SiC). Their outcomes expose that calcium intercalation shifts hydrogen at the graphene-SiC interface, ensuing in considerable n-doping and varying AB-stacked bilayer graphene into AA-stacked bilayer graphene. Adjusting the electronic form enhances carrier strength by barely marginally affecting Fermi velocity. This groundbreaking study opens up new possibilities for inspecting the typical traits of homogeneous quasi-freestanding AA-stacked graphene.

In another way, Zehra and colleagues portrayed a novel attempt established on photo-polymerized 1,1′-biphenyl-4-thiol self-assembled monolayers (SAMs) on copper substrates for graphene synthesis. Throughout light-induced polymerization and annealing, single-layer graphene was constructed using this system. They encountered that, in contrast to electropolished substrates, graphene on oxidized copper produces higher-value graphene. Importantly, this procedure makes it feasible to synthesize graphene on insulating substrates, which opens up opportunities for forming doped graphene in succeeding studies.

Laser-synthesized nanodiamonds for immunomodulation

The immunomodulatory influences of laser-synthesized nanodiamonds (LNDs) in numerous preparations—unconjugated, PEGylated, and antibody-conjugated—on peripheral blood mononuclear cells investigated by Alexander et al. According to their research, PEGylated and raw LNDs at extreme concentrations trigger minimal cytotoxicity. However, antibody-conjugated LNDs initiate immunological responses at elevated concentrations. These findings focus on the possible advantage of LNDs in biomedical applications and foster more experiments to expand their therapeutic design.

Thin film devices for computing

For post-von Neumann computing, Majumdar et al. explores the prospects of recently increasing nanoelectronic devices with ferroic ordering. They discover spintronic and ferroelectric devices in detail, underlining their exploits in neuromorphic routines and analog memory, exceptionally in critical environments. Their work emphasizes the implication of interdisciplinary assistance and the necessity to lay out neuromorphic hardware for future generations. It also investigates the consequence of ferroelectric effects and photo-induced magnetoresistance in emerging photonic memory and neuromorphic circuits, which are critical for the evolution of space and quantum computing machinery.

Numerous works on the manufacture of nanoparticles and their uses are explored in this research volume. It integrates cutting-edge performances for creating stable gold nanoparticles, such as magnetron sputter deposition onto castor oil. Likewise, investigations on the tasks of EVs in viral infections, the microbial synthesis of metal nanoparticles, and the performance of thermoresponsive polymers support information for industrial and biological applications. Nanotechnology is advanced in other areas like calcium intercalation in graphene, immunomodulatory effects of nanodiamonds, graphene synthesis from self-assembled monolayers, and piezoelectric materials for catalysis. Concerns on ferroic ordering in thin film devices pave the way for next-generation computer systems. When shown as an entirety, these works show the diverse prospects and exciting outlook of nanotechnology exploration.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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