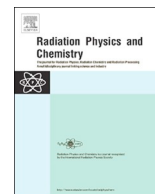




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Editorial

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The special issue entitled “*Radiation Technologies for the Synthesis of Nanoparticles and Nanostructured Systems*” aimed to provide a collection of works to highlight and demonstrate the role of radiation technologies over nanotechnological advances. The manuscripts herein described are a collective effort from radiation experts, researchers and professors from all around the globe towards advancing the matter and showing the scientific community that high-energy processing, whether via gamma, electron beam or x-ray, are relevant and compelling technologies for materials nanostructuring as well as for the development of nanoparticulate systems.

After several breakthroughs in science that have revolutionized our way of thinking, understanding and interacting with the environment and its surroundings, by far nanotechnology has enabled us to remodulate our understanding and especially our concepts concerning the relationship between the matter and its structure. Perhaps the most relevant contribution of nanotechnology refers to granting unique properties to materials as a function of size and shape, that are unlikely to occur in bulk materials, in a sense that upon nanostructuring, properties may be tuned and designed for specific purposes, enabling old materials to solve problems nowadays in an efficient and environment-friendly way.

With the advances of technologies and a better understanding of the role of nanostructuring and its implications over the properties of materials, an emerging platform of nano-based systems is currently being explored as we advance towards comprehending more and more the nano-bio interface, especially concerning the biomedical field. Applications of such systems abound, at the same pace as concerns regarding toxicity aspects as well as its safety use. Thus, techniques capable of promoting material nanostructuring that are environmentally friendly, do not require toxic reagents or compounds among other aspects are mandatory and essential for the progress of nanotechnology as a whole, especially as although some nanomaterials may be used for industrial or technological applications only, their interaction with the ecosystems is of extreme relevance.

Within this context, radiation technologies stand as alternative technologies to promote nanostructuring for a wide variety of materials, offering as an advantage and perhaps unique possibilities to process apart from temperature, in absence or presence of crosslinkers or initiators, also offering the option to carry out simultaneous processes such as crosslinking and sterilization in a single step. Also, radiation processing may be held in the final package and with no residuals, in most cases.

The mechanism beneath the radiation processing varies upon each

material and its state but not so much upon the technology. However, a general mechanism is attributed to the creation of reactive species in the material or upon contact with the milieu capable of triggering nanostructuring, achieved through direct or indirect effects of the radiation processing.

Radiation technologies have been used to produce or nanostructure a wide diversity of materials including but not limited to polymers, metals, biomolecules and other organic compounds and even hybrid systems composed by a mix of inorganic and organic materials, single- or multiphase. As a result, the products may be used for a myriad of applications and at different scales.

In this special issue, we targeted a broad range of different topics such as radiation technologies applied to nanomaterials, synthesis of nanoparticles by ionizing radiation, synthesis of nanoparticulated systems and nanocomposites, materials nanostructuring by ionizing radiation, development of nanostructured materials by radiation and, application of nanoparticles and nanostructured materials obtained by irradiation.

Particularly, this issue contains 19 manuscripts from renowned research centers worldwide, including original research papers and reviews, presenting the use of three main radiation technologies – gamma, electron beam, and X-ray. Also, some information regarding the use of UV, laser, and heavy ions have been reported. Within the above-mentioned technologies, nanoparticles, nanogels, and nanocomposites are distinguished in the presented documents.

Such materials were of polymeric (synthetic and natural, e.g., proteins), organic or inorganic nature (titanium oxide, metals, etc.). For some of them, possible applications have been proposed, mainly biomedical but also, for example, as nanocatalysts or dosimetry system components.

Thus, we are grateful to the authors that have contributed to the Special Issue, and we sincerely hope to be able to contribute and provide some information concerning the technology for the radiation community but also to those outside the community that may benefit from the unique features of radiation technologies, of course, applied towards its safe and beneficial use for humankind.

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