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## Green Nano-products Still Have a Long Way to Go from Lab to Market

2019-04-08

Despite the breakneck advancement of nanotechnology, green nano-products have made little headway in the market due chiefly to a number of key challenges waiting to be tackled in the commercialization process of this kind of products. This article expands on some possible solutions to address the underlying issues in this regard.

Green nanotechnology is a new term in the commercial and industrial literature of the world, aimed at providing the environmentally friendly products carrying minimized hazardous chemical risks, so as to control and prevent environmental pollution, while offering new services. For instance, silicon or carbon [quantum dots](#) are being substituted for the ones containing lead and cadmium, in so far as some of the displays on the market have recently been manufactured using cadmium-free quantum dots.

However, on the path from lab to market, green nanotechnology still needs to be improved further, and many projects in this field are still in the research phase. A number of serious stumbling blocks to the advancement of green nanotechnology are as follows.

Today, for the mass production of green nanomaterials at a reasonable price, innovative commercialization methods are of great importance. Such methods can only be achieved using fundamental research and extensive investigations that necessitate collaboration between industry and academia; thus, for breaking down the first barrier, commercial companies should jointly work with universities and research centers to come up with the new mass production methods of green nanomaterials.

Largely this arises from the lack of a specialized branch of science and engineering in research and academic centers to mainly focus on green nanotechnology, which barely does appear to be the solution in itself, but rather companies and industries should be involved in the scientific activities of these special departments so as to address the needs of this sector by undertaking a range of collaborative research projects for the ultimate goal of introducing green nano-products into the market.

The methods and procedures presently used for evaluating the toxicology of materials have been found wanting and need to be further improved and upgraded; otherwise, there is little chance of taking necessary steps to seek green alternatives to hazardous substances. This challenge can be tackled if only do legislators and metrology laboratories closely cooperate with industry and academia.

The lack of information about market demand, on the other hand, poses another obstacle to commercializing green nano-products. Since there are currently a limited number of green nano-products available on the market, drawing a comparison between these products and their common counterparts on the market, in terms of performance, price, market acceptance, and potential benefits compared to existing technologies, turns out to be problematic. For removing this roadblock that has gotten in the way of green nano-products, industries together with corresponding organizations, investors, and consultants should attempt to clearly define the capabilities of these products and identify their strengths and weaknesses compared to common technologies using various analyses.

The companies specializing in green nanotechnology are bound by the strict rules regulating the commercialization process of their products, which in most cases makes it too difficult for the manufacturers to produce and introduce their green nano-products into the market. Thus, the legislators should modify the current restrictive legal framework in light of rigorous research in such a way that assures consumers of the safety of these products, while helping companies market their green nano-products. For the meticulous modification of these rules and regulations, the collaboration between the legislators and a large number of nanotechnology specialists is of vital importance; standards organizations, and national laboratories can also play prominent roles in this process.