

Green sustainable natural nanomaterials and their promising applications

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Nanomaterials have been widely implemented in a variety of beneficial applications to humanity; however, most of these nanomaterials are not natural and synthesized by complicated industrial processes with dilemmas of being expensive, toxic, inefficient in energy and their potential environmental impact. Therefore, there is a growing need to implement green sustainable natural materials as precursors in nanoparticles synthesizing (nano-organics) by using green methods. The synthesized nanoparticles by green sustainable methods are environmentally benign and safe to use in many applications. There is a world movement towards creation a combination between nanotechnology and green chemistry to create and implement green technologies in synthesizing smart materials. In our green chemistry lab, nano-organics have been synthesized from cellulose and clay by simple green methods and applied in a number of important applications, including desertification treatment, pollutants degradation and drugs delivery.

Green mat for desertification treatment: In 2019, Iraqi invention aimed to create a natural green mat to reclaim sandy lands or fix sand dunes. The invention idea meets with the criteria of sustainable environmental and economic development to overcome the scarcity of water, food and energy especially in the developing countries.

The outer main layer of green mat formed from hydrogel as

a coating thin film for the purpose of water absorption falling on it. This film of hydrogel protects the plant seeds (barley) against the drought and atmospheric effects, assist the plants to immerse their roots inside the mat's layers and support the roots extension. The practical results were obtained for the agricultural reclamation of barley plants and stabilization of sand and were compared with local methods to treat desertification in Iraq or international methods, such as the Indian and Japanese companies that carried out projects in the UAE and other countries.

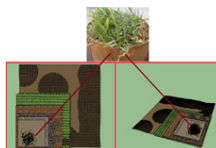


Figure 1. illustration of green cover layers with grown barley plant above the sandy soil.

Speaker Biography

Alaa K Al-Khalaf has a PhD in Physical Chemistry/ Green Chemistry from Cardiff University/School of Chemistry under the supervision of emeritus professor Keith Smith. He has many Iraqi patents and prizes in the field green chemistry and nanotechnology. His research team has been working on using green methods in synthesizing sustainable natural nanoparticles that can be used in many important applications to humanity.

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