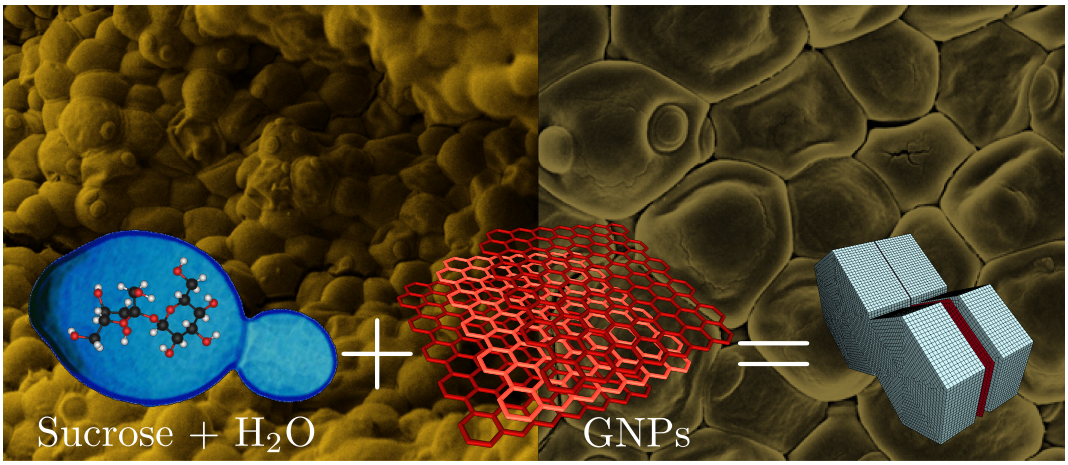
modulus, were studied via numerical simulations and are related to the properties of the constituent phases via rules of mixture. Finally, it was observed that graphene nanoplatelets, added to the nutrient broth, were able to reassemble onto the stressed cell surface and repair the surface cracking, partially restoring the pristine electrical and mechanical properties. The method reported here may find potential application in the development of self-healable bioelectronic devices and microorganism-based strain and chemical biosensors.



Keywords

biohybrid composites, functional properties, graphene, self-repairing.

Unicellular microorganisms, such as bacteria and fungi, are extensively used in materials science as simple templates with monodisperse sizes and shapes as well as low cost and scalable growth.[1] The features of a living cell along with characteristics of inorganic nanoparticles can be used for the development of novel materials. For example, encapsulation of the cell with inorganic shell has been found to enhance the robustness of the cell and improve its endurance in harsh environments. Some materials such as silica,[2] calcium phosphate,[3] and calcium carbonate[4] have already been used as encapsulating materials to improve the cell stability.