

## **Sea urchin as a model for development of new ecosafety nanoremediation**

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### **Project Summary**

The marine environment is subjected to contamination by different pollutants from a variety of sources. For the removal of these pollutants, traditional remediation methods (physical, chemical, and biological) are available; however, due to some limitations, they are unable to attain safety levels. These methods are generally laborious, time consuming and significantly expensive. Nowadays, nanotechnology is contributing to the development of specific and cost-effective remediation tools, which represent a better alternative for remediation and for sustaining the environment. Different nanostructured materials have been found to be very effective for the removal of a wide range of contaminants from the marine environment as compared to traditional methods. However, there may be some concerns remaining regarding the potential risks to the environment and human health associated with the use of nanomaterials. Ecotoxicology can provide suitable tools able to select ecofriendly and sustainable-engineered nanomaterials (ENMs) for environmental remediation. Nevertheless, there is an urgent need to develop a comprehensive guidance on how to perform ecotoxicological testing of ENMs in order to address current limitations and difficulties and support regulatory measures and environmental policies and promote an ecofriendly nanoremediation at both local and international scale.

With the rapid industrial development, environmental pollution due to discharging metals into marine environment is getting worse; consequently, contamination of marine ecosystems with heavy metals has become a topic issue internationally. Recently, a new class of nanocomposites, nanosponges, have been proposed to be in the most promising adsorbent in contaminated water treatment, and specially have been applied to the removal of heavy metals. However, nanosponges may itself or through the modification of marine environment exert harmful effects on marine biota. In this line, this project aims to evaluate the reprotoxicity of cellulose-based nanosponges on two different species of sea urchin. Reproduction is the most used endpoint in ecotoxicological risk assessment and it strongly depends on gamete quality. The proposed project goes beyond the simple toxicity exerted by nanotechnological devices; in fact, elucidating the molecular basis by which this class of nanosponges affects sea urchin gamete quality, it aims to provide specific tools able to select ecofriendly and sustainable nanodevices for marine environmental remediation.