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Learning from nature: biomimicry in nanotechnology education

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Over the 3.8 Gyr since life is believed to have appeared on Earth, components of the natural world have evolved to function effectively and persist. Ecosystems are therefore rich sources of information and fundamental models of successful, sustainable strategies from which we can learn. Biomimicry is the study and imitation of nature's designs and processes to solve human problems and is a core concept for sustainability. Several nano-based innovations have been inspired by nature, such as green synthesis techniques for nanomaterials, water-purifying membranes, and scaffolds for tissue engineering. However, biomimicry is still an underdeveloped practice in nanotechnology. Teaching researchers and industries how to learn about and apply attributes of ecosystems to design and manufacturing will play an important role in the development of sustainable nanotechnology. Thus, curriculum and training for sustainable nanotechnology should include (1) learning and applying basic concepts of biomimicry; (2) practicing decision making; and (3) improving collaboration skills, particularly with biologists and ecologists. By actively integrating these elements into nanotechnology education, we can reduce the gap that currently exists between the principles of sustainability and the practical realities of developing and producing nanomaterials and nanodevices.

Primary author: COROMINAS, Luís (Catalan Institute for Water Research)

Co-author: RODRÍGUEZ-RODA, Ignasi (Catalan Institute for Water Research)

Presenter: KISER, Mehlika Ayla (Catalan Institute for Water Research)

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