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"Civil and Environmental Engineering"



CRACKING THE CONCH CONUNDRUM: *Reverse engineering of the shells of mollusks*

by Prof. **Roberto Ballarini**

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Monday March 11, 2019
11.30-13.00 a.m.
Aula Caminetto

Natural composite materials are renowned for achieving impressive mechanical properties through their highly hierarchical structures. Sea shells are but one example. Despite being highly mineralized, with the organic component constituting not more than a few percent of the composite material, their fracture toughness can exceed that of single crystals of the pure mineral by as much as three orders of magnitude. Experimental and theoretical results are first presented that elucidate how the shell of *Strombus gigas* resists catastrophic fracture, and how it can self-heal through biomineralization. This is followed by a brief description of attempts to mimic certain microarchitectures of sea shells and their ability to self-heal. The results suggest that biological structures offer promise for guiding the design of synthetic structures with impressive mechanical properties.

BIO: *Dr. Roberto Ballarini is Thomas and Laura Hsu Professor and Chair of the Civil and Environmental Department at the University of Houston. Ballarini's multidisciplinary research focuses on the development and application of theoretical, computational and experimental techniques to characterize the response of materials to mechanical, thermal, and environmental loads. Ballarini has made significant contributions to the fields of mechanics, civil engineering, mechanical and aerospace engineering, materials science, biomedical engineering, and micro/nano technology. He has published more than one hundred papers in leading journals, including Science and Nature, and several of his research projects have been featured in the popular press, including the New York Times, American Scientist, Business Week, Financial Times, and Geo. Ballarini is Past-President of the ASCE Engineering Mechanics Institute, serves as Editor of ASCE Journal of Engineering Mechanics, and enjoys serving as visiting professor in universities across Europe and Asia.*

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