Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

**Structural and Optical Analysis of the Bio-mineralized Photonic Structures in the Shell of the Blue- Rayed Limpet *Ansates Pellucida*[1]**

MATHIAS KOLLE, Harvard University, LING LI, Massachusetts Institute of Technology, STEFAN KOLLE, JAMES WEAVER, Harvard University, CHRISTINE ORTIZ, Massachusetts Institute of Technology, JOANNA AIZENBERG, Harvard University — Many terrestrial biological organisms have evolved a variety of micro- and nanostructures that provide unique optical signatures including distinctive, dynamic coloration, high reflectivity or superior whiteness. Recently, photonic structures have also been found in the shells or spines of marine animals. Life under water imposes very distinct constraints on organisms relying on visual communication and on the designs and the materials involved in aquatic photonic structures. Here, we present a bio-mineralized calcium carbonate - based crystalline photonic system buried in the shell of the blue-rayed limpet *Ansates pellucida*. The structure consists of a layered stack of calcite lamellae with uniform thickness and inter-lamella spacing. This arrangement lies at the origin of the blue-green iridescence of the organism's characteristic stripes, which is caused by multilayer interference. The multilayer is supported by a disordered array of spherical particles with an average diameter of 300nm, likely serving to enhance the contrast of the blue stripes. We present a full structural and optical characterization of this bio-mineralised marine photonic system, supported by optical FDTD modeling.

[1]The authors gratefully acknowledge financial support by the Air Force Office of Scientific Research under Award No. FA9550-09-1-0669-DOD35CAP. M. Kolle is grateful for support from the Alexander von Humboldt - Foundation.

Mathias Kolle
Harvard University

Date submitted: 10 Dec 2012 Electronic form version 1.4