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Investigating the Structure and Composition of Freshwater Oyster Adhesive and Shell

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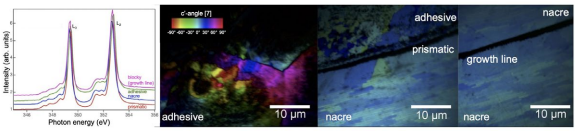

Etheria elliptica is a freshwater oyster found throughout Africa and Madagascar that plays an important economic role for local fisheries [1, 2] along with being an important contributor to their local habitat. *Etheria elliptica* produce a hard shell to protect themselves from predators, and an adhesive to allow them to maintain their position in the high energy environment in which they live. Despite showing promise as paleoclimate archives [3, 4, 5, 6], little is known about the adhesive the organisms produce during settlement nor has there been a systematic review of the shell structure. A combination of x-ray photoemission electron microscopy (X-PEEM), scanning electron microscopy (SEM), and microhardness testing data on the adhesive and shell show the mineralized portion of the shell (prismatic, nacre, and growth layers) consists entirely of aragonite, as does the adhesive (Figure 1). The aragonite making up the adhesive is nanoparticulate with varied orientation and density, while the aragonite in the prismatic and nacre regions is more uniform, both in density and orientation (Figure 1). The adhesive is significantly softer than the nacre or prismatic layers, with preliminary data indicating a hardness gradient within the adhesive with the adhesive increasing in hardness closer to the shell. Thus, *Etheria elliptica* oysters produce an aragonitic adhesive-shell system with varied mechanical properties.

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