

A scenic view of the University of Edinburgh at sunset. In the foreground, there is a grassy hill with several dark, pointed metal finials. To the left, a black metal fence runs along the edge of the hill, with a traditional street lamp nearby. In the background, the city of Edinburgh is visible, including the historic stone buildings of the Old Town and the silhouette of the castle on a hill. The sky is a mix of blue and orange, with soft clouds.

University of Edinburgh

Edinburgh, Scotland

Aded Yako '17

Retro-synthesis of Nacre

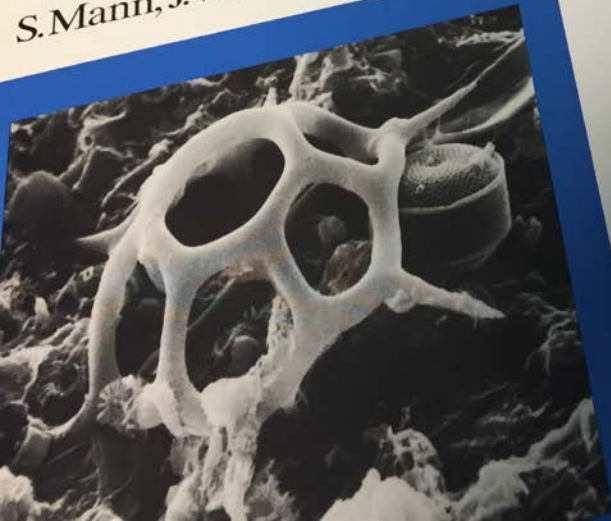
- Goal of project: study and understand the nucleation and growth of the layered crystal matrix in mollusk shells.
- First acquired mollusk shell pieces and decalcified them using different methods so that no minerals remained.
- Then cleaned the shell pieces and attempted to re-calcify them via different incubation environments containing different additives and different concentrations of additives.
- Then used imaging techniques such as SEM to study the nucleation and growth of the crystals.

Mollusk Shell

Biomimneralization

Chemical and Biochemical Perspectives

Edited by
S. Mann, J. Webb, R. J. P. Williams



VCH

Received September 1997
Received November 1997

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1992.

...range of micrograms per milliliter. Two flasks, containing
the solution with the matrix and 1 g of ammonium carbonate,
into a closed chamber (1000 cm³) for 24 h at room
temperature. Afterward, the matrix pieces were removed from
the solution, washed with water, and dried.
The artificial nacre (Supporting Information Figure 1a)
after only 24 h resembles closely the natural
surfaces by scanning electron microscopy (SEM).
The artificial nacre with transmission electron
microscopy (TEM) reveals areas with different degrees of

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Addadi, L. J. Mater. Chem. 1997, 7, 689
Venus 1979, 38, 205
d. T.; Klein, J.



My Experience

- I enjoyed coming into work everyday and thinking for myself, creating and conducting my own experiments, and making my own mistakes and then fixing them.
- Also the friendly environment of my lab tore down the notion that academic research is daunting and unwelcoming.

IR data



Date/Time: 01/06/2015 14:25:16

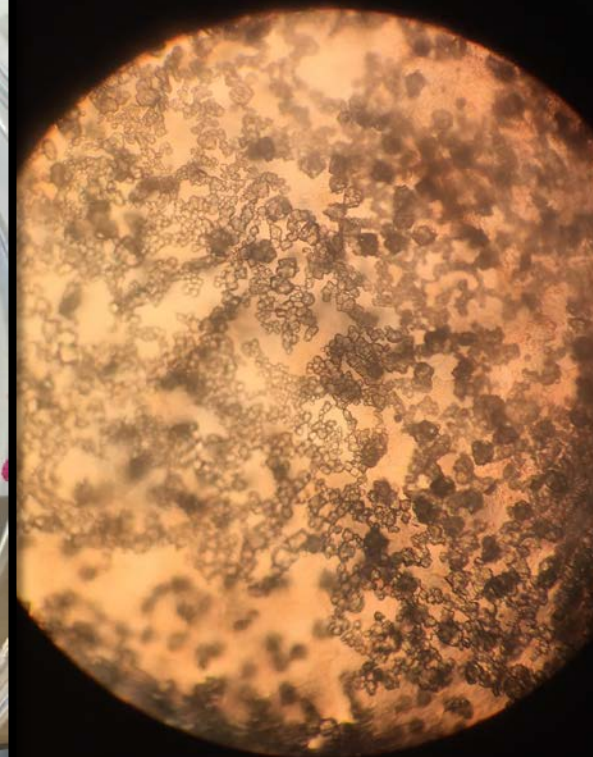
User: Organic

EDTA + R + CPC

Shell
Samples

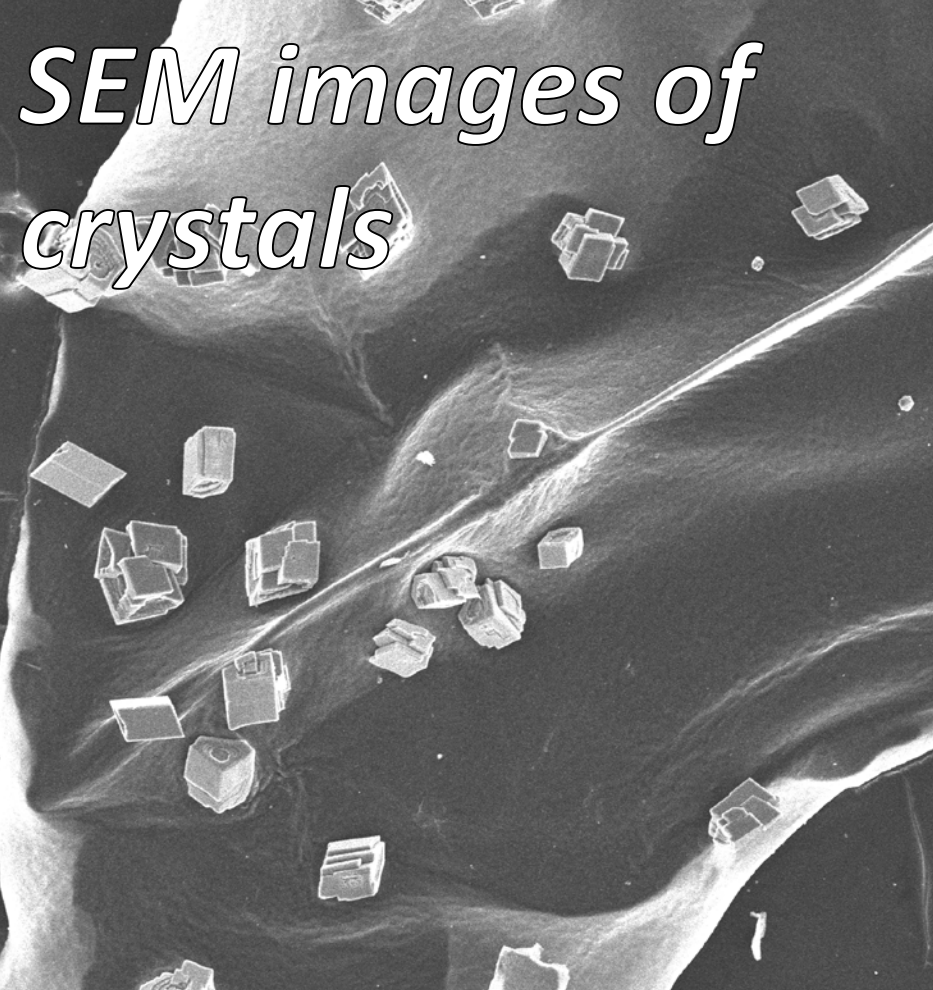
Mg²⁺ Experiments
SEM Sample

CaCO_3
crystals



Impact

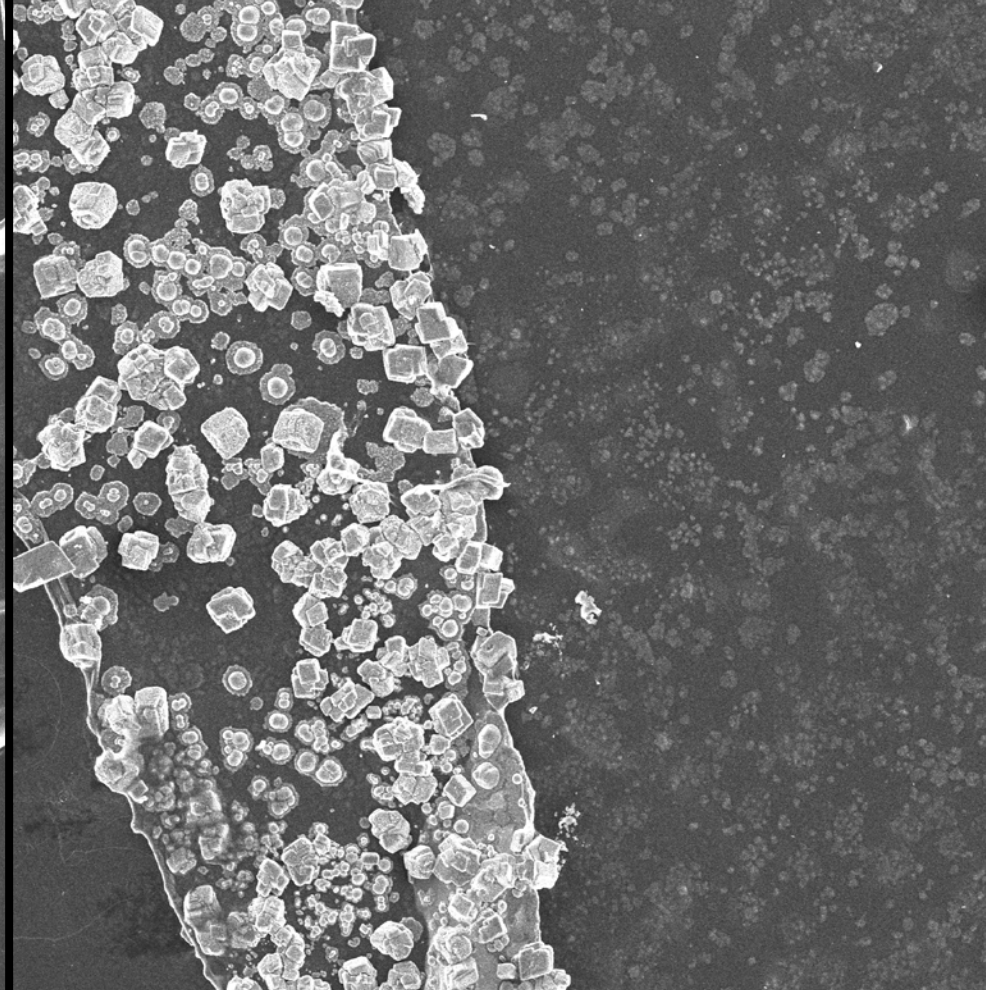
- I was able to start a project from scratch and decide which method of decalcification and re-clacification of the mollusk shells with which concentrations were most effective. Essentially I set up the foundation for a really interesting paper.
- My supervisor said that the project will be picked up by a Masters student or a post-doc.
- So I took the initiative to document precisely all the procedures I used and made a detailed presentation for who ever picks up my project so that they can reproduce all my results.



SEI 20kV WD26mm SS30

x100

100μm



SEI 20kV WD26mm SS30

x65

200μm

Career Plans

- I have always wanted to become an oral surgeon, but recently I have been interested in doing research.
- This research experience, which turned out to be extremely relevant to dentistry, helped me realize I could do both.
- I now plan on doing research after dental school, before I start my career as an oral surgeon.

Thank you IIP

- IIP is the best way to do research. You learn how to be responsible and independent, and not to mention, travel the world and experience new cultures.
- And for this I am forever grateful!

Now for some beautiful tourist pictures, all taken within walking distance of my lab!













Thanks for listening

- I recommend this IIP internship to anyone interested in Chemistry/Biochemistry or anyone who wants to experience any scientific research.