

Distinguished iNANO lecture of the week

- open to all

Professor Susan Stipp

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Title: More oil, less CO₂, cleaner water, how organisms make shells – the secrets of nature at the nanoscale

Time: Friday 27 January 2012, at 10.15
Coffee and bread will be served from 10 am

Location: Phys. AUD., 3rd floor, Dept. of Physics and Astronomy, building 1523

Abstract: Drinking water aquifers and oil reservoirs are huge but the physical and chemical processes that determine if our water is pure or if oil can be produced are controlled at the atomic scale. Until recently, we had no way to “see” precisely what happens so we had to make conceptual models based on data from macroscopic experiments – and that required considerable guesswork. Scientists relied on empirical constants because the theory for solid-fluid interaction was not well enough defined and computational power for huge systems was only a dream. Now, nanotechniques allow us to observe the surface of natural materials and watch as they interact with the fluids in contact: i.e., water, oil, gases, CO₂, and computer speed has increased allowing ab initio insight. From the new understanding we gain, we can begin to solve some of society’s biggest challenges.

Currently, our NanoGeoScience team is examining natural systems, such as: the submicrometer crystals of chalk to find out *what* makes them able to resist the laws of thermodynamics; *if* it is possible to trap toxic trace metals in green rust, a layered, iron mineral; *how* to see fluid flow through the nanometer scale pores in soils and rocks; and *why* the hydrophobicity of mineral surfaces change when the salinity of the fluid changes. The processes that take place at the solid-fluid interface are the same, whether it is the edges of growing bone, the scale that forms at the bottom of your tea kettle, the rust that forms on our bicycles, or the sugars that bacteria extrude to hold them fast on surfaces. Nature’s secrets hold promise.