

O 115: Overview Talk: Susan Stipp

Time: Friday 9:30–10:15

Location: TRE Phy

Topical Talk

O 115.1 Fri 9:30 TRE Phy

Natural Material Surfaces: How they behave and why we care — •SUSAN L. SVANE STIPP — Physics, Technical University of Denmark

The ultrahigh resolution techniques of physics and materials engineering can equally be used to investigate the solid-fluid interfaces that we find in nature. Although natural systems are extremely complex, molecular level understanding about the interactions between mineral surfaces and the gases and liquids in contact allows us to tackle the challenges that society and industry face in health, energy and the environment. Using techniques such as atomic force microscopy, X-ray photoelectron spectroscopy, micro and nanotomography and many

others, we have discovered some of the reasons that natural solid-fluid systems often do not behave as thermodynamic and kinetic models suggest that they should. Mineral surfaces are never a simple termination of the bulk so models with such assumptions are bound to fall short. Surfaces are restructured, hydrated and sometimes hydrolysed. Adsorbed species, even at fractions of a monolayer, change surface free energy dramatically. The secondary minerals produced as reaction products are often too small to identify using traditional techniques but they control chemical reactivity and often affect flow of fluids through porous media. Current examples are conversion of CO₂ back to rock, where it is stable for millennia, and the role of organic compounds in controlling biomineral growth.