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Non stick coatings from thin air

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Non stick coatings are everywhere in nature and these have stimulated numerous applications in industry. For example leaf surfaces have been the inspiration for novel waterproof textile coatings. Insect wings may hold the key to strategies for antifouling on marine vessels and the associated energy savings that go hand in hand with such developments.

The latest "green"nanotechnology approach to fabricating extremely non-stick surfaces involves self-organized and chemically cross linked nanoparticles. These generate exceptionally rough multi scale hierarchical (ultra rough) interfaces that simultaneously possess a unique ability to self-clean.

But what is behind such an effect? Why does a lotus leaf stay clean in nature but when freshly cut it rapidly contaminates? Rinsing inert "dirt"from textiles is enhanced if the surface has multi scale roughness yet biological (live) contaminants "sense"subtle nanoscale features and may "hold on"despite such washing.

This talk will discuss investigation of immersed interfaces using synchrotron X ray scattering and phase contract imaging at Australian and Canadian Lightsources respectively.
Results suggest that ultra rough surfaces that are visibly soaked are not necessarily completely wet and this can have major implications with respect to optimizing, for instance, antifouling behavior. It all about what is trapped in the interface.

Similarly, fine tuning bulk mixtures of nanoparticle cluster sizes and variable surface architectures can have a major impact on film optical properties and not surprisingly non stick surface properties.

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