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WITHDRAWN Nanoengineering materials: a bottom-up approach towards understanding long outstanding challenges in condensed matter science

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Chemists have made tremendous advances in synthesizing a variety of nanostructures with control over their size, shape, and chemical composition. Plus, it is possible to control their assembly and to make macroscopic materials. Combined, these advances suggest an opportunity to "nanoengineer"materials ie controllably fabricate materials from the nanoscale up with a wide range of controlled and potentially even new behaviours.

Our group has been exploring this opportunity, and has found a rich range of material electronic behaviours that even simple nano-building blocks can generate, e.g. single electron effects, metal-insulator transitions, semiconductor transistor-like conductance gating, and, most recently, strongly correlated electronic behaviour. The latter is particularly exciting. Strongly correlated electrons are known to lie at the heart of some of the most exotic, widely studied and still outstanding challenges in condensed matter science (e.g. high Tc superconductivity in the cuprates and others).

The talk will survey both new insights and new opportunities that arise as a result of using this nanoengineering approach. The talk will also outline how such materials have provided inspiration for new technologies.

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