Introducing the next generation of chemical reactors

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Unique nanostructures which respond to stimuli, such as pH, heat and light will pave the way for safer, greener and more efficient chemical reactors.

Being developed by a consortium of UK universities, the nanostructures can regulate reactions, momentum, and heat and mass transfer inside chemical reactors. This technology will provide a step change in reactor technology for the chemical, pharmaceutical and agrochemical industries.

Professor Yulong Ding of the Institute of Particle Science and Engineering at the University of Leeds explains: "This research programme is an important step towards producing the next generation of smart "small footprint", greener reactors. The responsive reaction systems we are investigating could make the measurement systems currently used in reactors redundant."

The technique is being developed through a collaborative research programme initiated by Professor Ding together with Dr Alexei Lapkin at the University of Bath, and Professor Lee Cronin at the University of Glasgow.

The programme involves designing and producing molecular metal oxides and polymers as building blocks, and engineering those blocks to form nanoscale structures, which are responsive to internal and / or external stimuli such as pH, heat or light. The structures can be dispersed

in fluid, or coated on the reactor walls.

As conditions inside the reactor change, the nanostructured particles will respond by changing their size, shape, or structure. These changes could in turn alter transport properties such as thermal conductivity and viscosity, and catalyst activity – and hence regulate the reactions.

Professor Ding also believes that these systems also have the potential to eliminate the risk of 'runaway', where a chemical reaction goes out of control.

Source: University of Leeds