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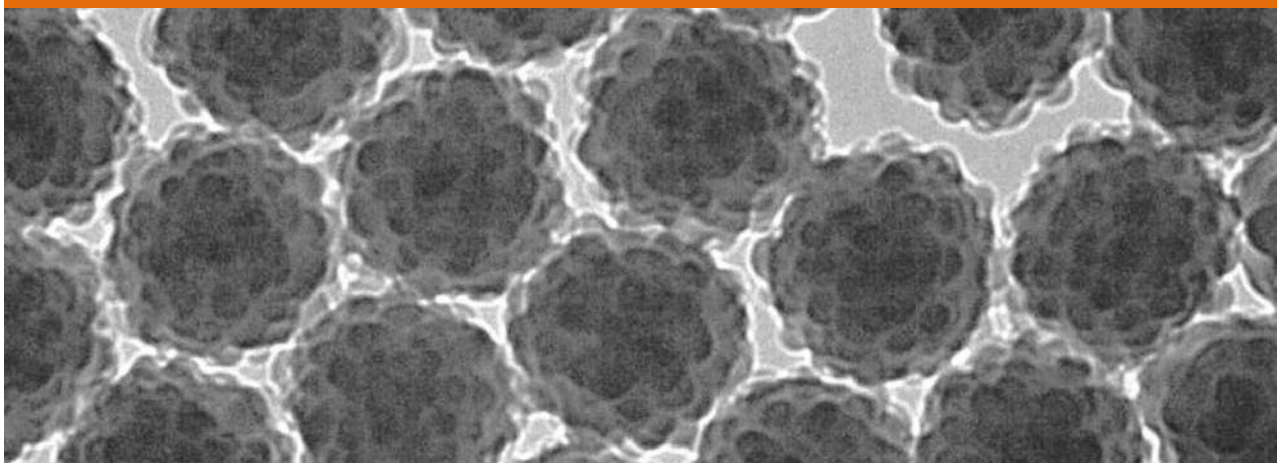
enterprise

Uniform raspberry-like colloidal particles

Novel colloidal materials, new applications



Professor Oren Scherman and his team at the University of Cambridge, have developed a new 'raspberry-like' colloidal material with high surface area, enhanced resistance to aggregation and self-assembly capabilities. The team is now keen to collaborate with partners to explore the potential of this exciting new material. Possible applications range from metal scavenging and lubricants for oil drilling to marine coatings and water desalination.

Key Benefits

- Unprecedented salt stability opens up new applications for colloids in marine and biological environments
- Simple and cheap one-step synthesis that can be adapted for a range of polymer materials
- Enhanced surface area for potential catalysis applications
- Structural colour rather than chemical colour from dyes means resistance to fading

Oren Scherman is Professor in the Department of Chemistry, University of Cambridge. His renowned contributions to research have led to numerous awards including the RSC Hickinbottom Award in 2013 and the Cram Lehn Pedersen Prize in Supramolecular Chemistry in 2014. His work on uniform raspberry-like colloidal particles is protected by a GB patent application.

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Applications

A vast array of common products rely on a family of chemical particles known as colloids. From ice cream and mayonnaise, to washing liquid and hair dye, to paints and suncream, the properties of those colloids directly impact the functionality and usability of the products.

Colloids, due to their highly adaptable nature, have underpinned major advances in fields as diverse as more effective drug delivery to enhancements in water treatment. Despite the key role already played by colloids in over 7000 industrial processes, the majority of these colloids are very simple in form and there is a great deal of additional functionality that could be achieved with more advanced colloidal formulations.

The research team, which involves a collaboration between the Chemistry and Physics departments, have developed a technique to produce and tailor new colloid particles to meet the specific needs of a wide range of applications.

The colloids are typically several hundred nanometres in size, with very high surface area, potentially enhancing surface chemistries such as catalyst. Available in hollow form, or with many internal cavities, the colloidal particles can be loaded with other smaller molecules, which can either remain permanently within the structure or be released under pre-determined circumstances. This opens up interesting possibilities, for example, if the small molecules are dyes, it would be possible to produce mayonnaise in any required colour!

They are very stable in salt solutions, which allows them to be used in high salt concentrations such as marine environments and the human body, without aggregating together.

The simple, one-step, flexible synthesis creates mono-disperse core-shell particles that can self-assemble to create structural colouration such as that found in nature in birds' feathers and butterfly wings. Generating colour without the use of conventional dyes overcomes issues with fading and dye toxicity.

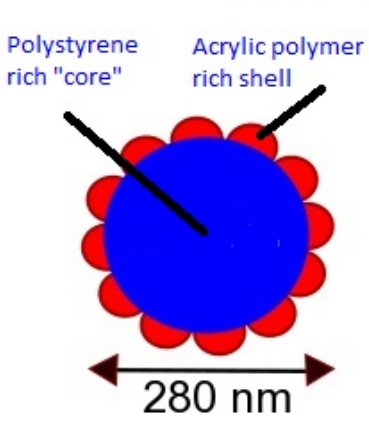

Figure 1: A schematic showing the colloidal particle, in this instance with a polystyrene core and acrylate monomer forming the hierarchical shell

Figure 2: A "drawing" of a raspberry using an ink formulated using the raspberry colloids

We anticipate that this unique combination of properties, and the ability to tailor the colloid particles to have different properties, could open up many diverse applications from metal scavenging and catalysis to enhanced oil recovery and beyond.

Next steps

This technology is protected by a patent application in the UK. We are now looking for partners to help us validate the material in ionic applications. Please contact us if you would like to explore this opportunity with us.