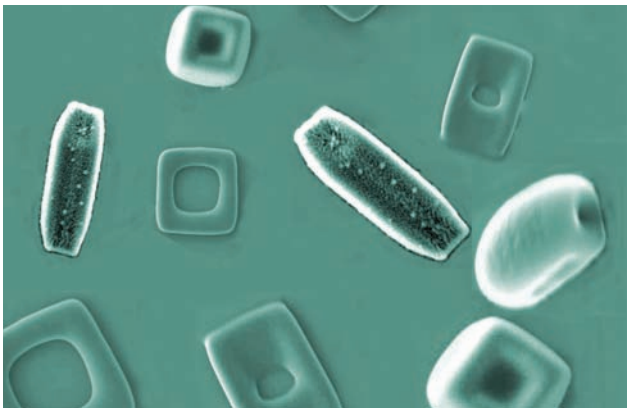
Higher throughput and better particle resolution available

The shape of things to come

A microfluidic device technique called stop-flow lithography, for making custom designed polymeric particles with complex geometric shapes, has been developed by US researchers.

Patrick Doyle and colleagues from MIT are working on methods for synthesising particles with complex geometric shapes. While spherical particles are widely used in applications like optical devices, drug delivery and diagnostics, more complicated particles could enable new technologies in these areas, but they are difficult to make. Building on his team's previous work to face this challenge, with a method combining microfluidics with projection-photolithography called continuous flow lithography (CFL), Doyle devised a technique called stop-flow lithography (SFL).

SFL gives a higher particle throughput and better particle resolution than CFL. A unique feature of the new method is that the particles formed are not just spherical – it can make a wide range of shapes. SFL also allows the formation of particles in biocompatible and easily functionalised materials that are not typically amenable to photolithographic methods.



A wide range of complex shapes can be made

Doyle hopes to expand the range of particle morphologies and materials accessible to SFL. 'We are also looking at several potentially interesting applications for these particles in diagnostics as well as in conducting fundamental studies on colloidal assembly and rheology,' he said.

A challenge for the future is the scale-up of particle throughput to match current industrial processes. 'This is not so much of a concern for niche applications enabled by complex particles where no alternative technology exists and only small volumes of particles are desired. However, it is important when particles made using microfluidic techniques are sought to be used in more routine applications such as paints or coatings,' said Doyle.

Elinor Richards

Reference
D Dendukuri *et al*, *Lab Chip*, 2007, DOI: 10.1039/b703457a

Road run-off systems could improve collection of heavy metals

Modelling metallic emissions

ISTOCKPHOTOS

Pollutants can enter groundwater or soil

Researchers in Switzerland have developed a method of modelling heavy metal emissions from road traffic.

Many heavy metal pollutants such as cadmium and lead are toxic at fairly low concentrations and can poison biological organisms if they are accumulated. A variety of heavy metal contaminants can enter the environment from road traffic emissions. Once released into the environment, these pollutants can enter groundwater and contaminate the soil.

Now Michele Steiner and co-workers at the Swiss Federal Institute of Aquatic Science and Technology and Swiss Federal Institute of Technology have developed a model describing heavy metal emissions from road traffic. This model describes metal fluxes into the roadside environment as a function of the distance from the road. The model distinguishes between three different pollutant transport mechanisms (road run-off, spray and drift), and was applied to a case study of Burgdorf, Switzerland.

The team found that up to 50% of the heavy metal emissions from road traffic could be collected and treated with the design and implementation of appropriate road run-off treatment systems.

Russell Johnson

Reference
M Steiner *et al*, *J. Environ. Monit.*, 2007, DOI: 10.1039/b703509h