# Microgels' behaviour under scrutiny

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Being a physicist offers many perks. For one, it allows an understanding of the substances ubiquitous in everyday industrial products such as emulsions, gels, granular pastes or foams. These are known for their intermediate behaviour between fluid and solid. Paint, for example, can be picked up on a paintbrush without flowing and spread under the stress of the brush stroke like a fluid. Baudouin Geraud and colleagues from the Light Matter Institute at the University of Lyon, France, have studied the flow of a microgel confined in microchannels. They have shown, in a study just published in the *European Physical Journal E*, that its behaviour under confinement differs from predictions based on standard theories. Indeed, its molecules are not only subjected to local forces, but also to neighbouring forces that affect its flow.

The authors chose to study the influence of confinement on the flow of a polymer microgel named Carbopol. It is made of jammed acrylic acid polymer blobs, typically a few microns in size, dispersed in water. For the first time, they explored whether this network of polymers can have an impact on the flow of this microgel when confined under a large range of pressure differentials and fluid movement speeds.

They relied on techniques including an approach constraining the complex fluid in sub-millimeter scale microchannels, known as microfluidic. They also used a high-resolution particles' speed measurement method called Tracking Particle Velocimetry and studied the flow response to an external force.

Geraud and colleagues confirmed, for the first time in a microgel, that

the flow properties at a local point do not depend only on the local force but also on the dynamics of its vicinity. This has previously been shown in concentrated emulsions, granular materials and foams under confinement.

**More information:** Geraud, B., Bocquet, L. and Barentin, C. (2013), Confined flows of a polymer microgel, *European Physical Journal E* 36: 30. DOI 10.1140/epje/i2013-13030-3