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Capillary Microfluidics for Viscoelastic Fluids

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In conventional microfluidic devices, fluids are pumped by applying either pressure drop or temperature or voltage differences. In biomedical technologies dealing with fluids of a complex rheology, the forced fluid transportation is sometimes hardly applicable. We present a new principle of controlled fluid transport at micro- and nanoscale. This approach is based on the phenomenon of spontaneous absorption of wetting fluids by porous materials. That is, capillarity drives the droplet self-propulsion without the need for any additional external mean. We study viscoelastic fluids and develop some theoretical and experimental approaches to tackle this problem. Aqueous solutions of polyacrylamide (PAM), polyethyleneoxide (PEO) and lambda-DNA are taken as model polymeric fluids.

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