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ER fluid in microfluid Systems

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Electrorheological (ER) fluid is considered as a kind of smart material which is able to be used for microfluidic systems to achieve active and precise control of fluid by electrical signal. While, microfluidics, especially droplet microfluidic, attracts much attention recently from diverse research fields due to its highly integration, digitalization and computercontrolled characteristics. Here, we will introduce our recent experimental results of ER fluid-based microfluidic droplet generation and manipulation. Two methodologies by employing ER fluid into microfluidic system: digital generation, manipulation of "smart droplets" and droplet manipulation by ER fluid will be presented. Once it is combined with real-time detection, electroreologically integrated chip with many functions can be realized. Some other applications of using GER fluid in microfluidic chips, such as the microfluidic logical gates, are also introduced. Some potential application of ER fluid for hydraulic system will be also introduced.