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NMR velocity imaging of single liquid drops A. AMAR, S. STAPF, B. BLUEMICH, ITMC-RWTH Aachen, Germany — Liquid-liquid extraction processes are often found in industrial applications when a bulk phase needs to be purified from dissolved components. The extraction strategy consists of dissolving the impurities into a second, carrier phase, with optimal performance being guaranteed by maximizing both contact interface area and mass transfer rate, in the shape of a swarm of dispersed droplets. Their buoyancy-driven flow within the continuous medium induces internal fluid motion driven by momentum transfer at the drop surface. This convective transport enhances mass transfer and the efficiency of an extraction column. However, understanding mass transfer depends on a proper description of the flow field inside and outside the drops. For that purpose, a cell was built that enables the levitation of a single drop within a counterstream of water. NMR velocity imaging was then applied to drops of different fluids to monitor the internal dynamics as a function of drop size, age, and interface tension. Vortex-type patterns in at least part of the drop were observed where their size and velocity magnitude depended on the system impurity concentration.

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