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A rheological study of wormlike micelles flows in microchannel JEAN-BAPTISTE SALMON, CHLOÉ MASSELON, ANNIE COLIN, LOF, CNRS-Rhodia-Bordeaux 1 — Complex fluids show non linear properties under simple shear flow leading to flow induced phase transitions and instabilities. The flow curve of wormlike micelles exhibit a stress plateau separating high and low viscosity branches, corresponding to shear-banding flows. Our aim is to understand the structure/concentration/flow coupling of wormlike micelles. A microfluidic chip is easy to couple with many analytical methods; it is hence well adapted to our study. We both perform particle image velocimetry and microscopy on a microfluidic chip consisting in channels with dimensions 250 μm large and 1 mm deep. Such a canyon geometry enables us to relate the measured velocity profiles to the local rheology. We evidence shear banding and slip at the walls. Strikingly there is no single rheological law that describes the velocity profiles at different pressure drops. Using microscopy, we point out turbid bands at the walls corresponding to the highly sheared bands. At low pressure drops, these bands are stable in time and their widths increase with increasing pressure until a limit where they fluctuate in space and time.

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