

Abstract Submitted  
for the DFD06 Meeting of  
The American Physical Society

**A rheological study of wormlike micelles flows in microchannel**  
CHLOÉ FÉLICIE MASSELON, JEAN-BAPTISTE SALMON, ANNIE COLIN,  
LOF, CNRS/Rhodia/université Bordeaux I — Complex fluids show non linear prop-  
erties under simple shear flows since they have various microstructures leading to  
flow induced phase transitions and instabilities. Such a coupling has widely been  
studied for wormlike micelles. Their flow curve exhibits a stress plateau separating  
high and low viscosity branches, corresponding to a shear-banding flow. 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 a straight channel with dimensions: 250  $\mu\text{m}$  large  
and 1 mm deep. Such a “canyon” geometry enables us to simply relate the measured  
velocity profiles to the local rheology. We evidence shear banding flow 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 of the channels corresponding to the highly sheared bands. It seems that  
the shear induced phase has a lower concentration than the low sheared band. 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.

Chloé Félicie Masselon  
LOF, CNRS/Rhodia/université Bordeaux I

Date submitted: 18 Aug 2006

Electronic form version 1.4