

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Permanent Flow-Induced Phase Transitions in Wormlike Surfactant Micelle Solutions¹ MUKUND VASUDEVAN, Cytec Industries Inc. Stamford, CT, ERIC BUSE, Washington University, Saint Louis, MO, AMY SHEN, University of Washington, Seattle, WA, BAMIN KHOMAMI, University of Tennessee, Knoxville, TN, RADHAKRISHNA SURESHKUMAR, Washington University, Saint Louis, MO — It is well known that certain wormlike micelle solutions form flow-induced structures under shear flow. This structure transition is typically accompanied by an enhancement in the shear viscosity and the emergence of a new gel phase. However, such transitions are generally believed to be reversible, i.e., upon flow stoppage, the structure relaxes to equilibrium. In this work, we show that by subjecting translucent wormlike micelle solutions to high flow deformation over a rapid time scale, permanent flow-induced structures can be formed. We will discuss the phenomenology and plausible physical mechanisms underlying this discovery.

¹NSF, NSF-REU

Radhakrishna Sureshkumar
Washington University, Saint Louis, MO

Date submitted: 20 Nov 2008

Electronic form version 1.4