Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Effect of Strain Rate on the Deformation of Red Blood Cells Entering a Constriction JORDAN MANCUSO, WILLIAM RISTENPART, Dept. Chemical Engineering, University of California Davis — Although much work has investigated the stretching behavior of RBCs in shear flows, relatively little work has examined the deformation that occurs in the physiologically important extensional flow at the entrance to a constriction. In particular, there is currently no analytical model to predict the extent of deformation as a function of the strain rate in the constriction entrance. Here we experimentally elucidate the relationship between strain rate and the dynamic stretching behavior of RBCs as they enter a microfluidic constriction. We systematically varied the flow rate and the microchannel geometry to vary the strain rate, and we measured the resulting RBC deformations with high speed video. We demonstrate that the Kelvin Voigt model captures the stretching dynamics, and that the RBC membrane elastic shear modulus increases approximately linearly with increasing strain rate.

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Date submitted: 01 Aug 2015 Electronic form version 1.4