Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Liquid Drop Growth On A Fiber In Fibrous Filters S.V. DOIPHODE, Maurice Morton Institute of Polymer Science, The University of Akron, A.L. YARIN, Faculty of Mechanical Engineering, Technion - Israel Institute of Technology, Israel, W. LIU, Maurice Morton Institute of Polymer Science, The University of Akron, G.G. CHASE, Department of Chemical Engineering, The University of Akron, D.H. RENEKER, Maurice Morton Institute of Polymer Science, The University of Akron — This paper describes and verifies a quantitative model to predict the growth by coalescence of oil droplets on a single fiber. The model considered a stream of fluid carrying many tiny droplets of a different fluid. Different capture mechanisms by which the tiny droplets are captured by a drop growing on a fiber were examined, including: interception, Brownian motion of droplets and vapor deposition by diffusion. Number average distribution and volume average distribution of particle diameters were used to characterize the tiny droplets. The comparison, of the predictions for different droplet capture mechanisms, with the experimental data showed that both droplet interception and Brownian diffusion contribute to drop growth on the fiber for droplets in the size range from 1 to 1000 nm. Brownian motion was found to be the dominant mechanism of the two. Merging of growing drops on the fiber was also modeled and experimentally observed. The experimental merging time for drops was close to that predicted.

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Date submitted: 02 Dec 2004 Electronic form version 1.4