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**Large-scale diffusion of entangled polymers along nanochannels**

KAY SAALWACHTER, FRANK LANGE, Martin-Luther-U. Halle-Wittenberg, Germany, MARTIN STEINHART, U. Osnabruck, Germany, PATRICK JUDEINSTEIN, Lab. Leon Brillouin, CNRS-CEA Saclay, France — Confinement-induced changes in polymer mobility are still under active discussion. For weakly interacting poly(butadiene) chains in 100  $\mu\text{m}$  long, 20 and 60 nm wide channels in anodic Al<sub>2</sub>O<sub>3</sub> [1], we here report on the study of the large-scale pore-averaged self diffusion on a  $\mu\text{m}$  scale by 1H pulsed-gradient NMR. We find weak indications of an acceleration due to surface-induced disentanglement [2]. Unlike previous reports on polymer diffusion into particle nanocomposites of similar confinement scale [3], or start-up diffusivities out of even thinner films [4,5], we find an MW and temperature independent reduction of diffusivity that is solely determined by the confinement size. We rationalize this trend by a simple volume-average model, which suggests a 20-fold surface-enhanced monomeric friction on the scale of the packing length, which can be compared to a factor of 300 that our model predicts for comparable thin-film data of poly(styrene) on silica [4].

- [1] S. Ok et al. *Macromolecules* **43** (2010) 4429;
- [2] D. M. Sussman et al. *Macromolecules* **47** (2014) 6462;
- [3] J. Choi et al. *ACS Macro Lett.* **2** (2013) 485;
- [4] B. Frank et al. *Macromolecules* **29** (1996) 6531;
- [5] X. Zheng, et al. *Phys. Rev. Lett.* **74** (1995) 407

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