Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Viscoelastic Properties of Metathesis Synthesized Linear and Cyclic Macromolecules JIAN WANG, GREGORY MCKENNA, Texas Tech University, IRINA GORODETSKAYA, ROBERT GRUBBS, California Institute of Technology — A novel method of synthesis[1] now permits the creation of closed, uncatenated rings in relatively large amounts ($>$ 1g). The metathesis synthesis route results in samples with relatively low polydispersities of $<$2. Here we report on a series of experiments on poly(octenamer) and polyethylene rings made by hydrogenating the poly(octenamer). The samples are being characterized for molecular weight, radius of gyration and intrinsic viscosity to assure their ring-like nature. Then, using conventional methods of rheometry, we are obtaining the dynamic moduli and zero shear rate (zero frequency) viscosities of the materials and comparing them to their linear analogues. Results for polymers having molecular weights between 1x10^5 and 5x10^5 g/mol, which is between 80 and 400 entanglements per chain assuming the linear entanglement molecular weight, will be discussed. Finally, in spite of the relatively low polydispersity of these samples, additional work is ongoing to fractionate them in order to obtain narrow fractions (M_w/M_n $<$1.1) in order that the plateau modulus and the steady state rubbery plateau modulus can be obtained. Initial work suggests that G_N^0 for the rings and for the linear chains is similar. [1] Bielawki, C. W.; Benitez, D; Grubbs, R. H.; *Science* **2002**, 297, 2041.

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Date submitted: 11 Jan 2006 Electronic form version 1.4