

## **144n Microchip Measurements of Intrinsic Viscosity of Polymers and Biopolymers**

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The intrinsic viscosity values are important for probing molecular structure and interaction with solution. A new microchip method is described for fast and accurate measurements of intrinsic viscosity of polymer and biopolymer solutions. The microfluidic chip performs automatic dilutions of polymer sample with a fluorescent dye by imposing pressure gradients across the channel network in the microfluidic chip. The measured fluorescent signals at different dilution steps are used to evaluate the intrinsic viscosity of the polymer sample. The measurement procedure requires only five minutes after loading the sample on the chip while using a few of microliters of polymer solution at a low concentration. The new technique is useful in many chemical, biological and medical applications where sample is available in very small quantities. The intrinsic viscosity experiments were performed for three classes of polymer solutions: (a) polyethylene glycol – polymers with straight aliphatic chains; (b) Bovine Serum Albumin - protein chains with hydrophobic and hydrophilic amino acids, and (c) DNA – double stranded polymeric chains. The measured values of intrinsic viscosity agree remarkably well with the available data obtained using different methods. The experiments were also performed to explore the effect of solvent quality and salt concentration on the intrinsic viscosity of polymer solutions. The method offers a new way to study the conformational changes in proteins and DNA solutions in various buffer conditions such as pH, ionic strength and surfactants. The effects of microchannel shear rate and mixing time on the accuracy and limitation of measurement method are discussed.