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**A Comparison of Particle Embedment and Nanoindentation: Probing the Surface Properties of Polymeric Materials<sup>1</sup>** MEIYU ZHAI, HEEDONG YOON, GREGORY MCKENNA, Texas Tech Univ — In this work, we report the results from a comparison of viscoelastic surface properties of polymer obtained from two different techniques: the spontaneous particle embedment technique and nanoindentation technique. The surface compliance for polystyrene(PS) and poly(isobutyl methacrylate) (PiBMA) were determined using multi curve fitting method to extract the viscoelastic response from the experimental results. The surface layer rheological properties obtained from particle embedment experiment and indentation are compared both with each other and with the bulk properties. For both materials we observed surface softening when the test temperature is below the macroscopic glass transition temperature. This is followed by a crossover to a surface stiffening region when the test temperature is higher than the macroscopic glass temperature. **KEYWORDS:** nanoindentation, particle embedment, multi curve fitting method, viscoelastic properties

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