

556c Low Temperature Growth of Thick Polystyrene Brushes Via Atrp

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Atom transfer radical polymerization (ATRP) of styrene has typically been done at temperatures near or above the T_g for polystyrene. Under these conditions, thermal self-polymerization of styrene occurs readily, resulting in consumption of monomer and, in the case of graft polymerization, cessation of layer growth. In this work, we examine the low temperature, surface-confined growth of polystyrene (PS) from a primary polymer layer of poly(glycidyl methacrylate) (PGMA) on silicon using ATRP. The PGMA layer provides a large number of bromoester surface initiator sites compared to self-assembled monolayers and has yielded high graft density PS brushes by ATRP at 130 °C. By lowering the temperature to 60 °C, we were able to grow thick PS brushes with rapid kinetics using the CuBr/PMDETA catalyst system. Furthermore, growth rates were linear, which indicates that growth was controlled, even without addition of Cu(II) or sacrificial initiator.