Quantitative Determination of the Chemical Composition of Silica-Poly(Norbornene) Nanocomposites THOMAS SEERY, University of Connecticut, MARK JORDI, Jordi Associates, UNIVERSITY OF CONNECTICUT POLYMER PROGRAM TEAM — Hybrid materials consisting of a silica nanoparticle surrounded by a grafted poly(norbornene) brush have been prepared by ring opening metathesis polymerization (ROMP). A quantitative determination of each stage of composite formation has been accomplished including a determination of the density of surface bound functional groups, catalyst molecules, and polymer chains. This analysis has enabled the determination of the reaction efficiency between the catalyst and the surface bound functional groups as well as the determination of the fraction of metal mediating species that initiate a polymer chain. Control of the chain density was demonstrated by two methods: the use of controlled reaction times between the catalyst and the surface, and the variation of the surface functional group density. Polymer chain densities resulting from composites prepared with different tether structures will also be reported. The resulting brush densities were found to span a wide range including those previously reported for polymer layers formed by adsorption, grafting of preformed polymer chains, and surface initiated polymerization (SIP).

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