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Modification of Nanocomposite POSS-PMMA Surfaces by Exposure to Reactive Oxygen. REBEKAH ESMAILI, JACOB FORSTATER, BRIAN H. AUGUSTINE, WM. CHRISTOPHER HUGHES, James Madison University — Thin films of the nanocomposite copolymer polymethylmethacrylate-polyhedral oligomeric silsequixane (PMMA-POSS) have been deposited onto glass and polymeric substrates and modified by exposure to reactive oxygen. The source of the oxygen was either a remote capacitively coupled plasma or UV-generated ozone. A change from hydrophobic to hydrophilic was observed after exposure to oxygen for time periods greater than 20 seconds. This change was quantified by measuring water contact angles on the surface which varied from greater than 90 $^\circ$ before plasma exposure to less than 10 $^\circ$ afterwards. A model for this behavior in which the isobutyl groups around the POSS cage are selectively removed by the oxygen plasma leaving a SiOx-rich surface is proposed. Time-of-flight secondary ion mass spectroscopy (ToF-SIMS) data were performed to test this model and show that the number of isobutyl groups on the surface does decrease with exposure time. Ongoing experiments involving the effect of oxygen exposure on the electro-osmotic flow in microfluidic structures which incorporate these films will be discussed.

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