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The Promotion of Au Adhesion on Polymer Surfaces Using Polyhedral Oligomeric Silsequioxane CHRIS HUGHES, BRIAN AUGUSTINE, ALAN MO, JONATHAN WYRICK, BRUNO CAPUTO, ETHAN ROSENTHAL, James Madison University — The adhesion of Au on polymer surfaces is weak because of the inert nature of Au and the non-polarity of the hydrocarbon surface of the polymer. We seek to fabricate microfluidic devices in which vacuum deposited gold thin films will be used in electrical contacts and optical reflectors. Various fabrication steps involve the use of solvents which easily wash away the gold. To overcome this, we have explored the use of a thin layer of polyhedral oligomeric silsequioxane-methacrylate (POSS-MA) which is a nanocomposite having both polymer and inorganic silica glass characteristics. The POSS-MA is spun cast onto the surface of PMMA creating a film which is on the order of 100 nm thick. Au dots that are 1 mm in diameter were deposited onto both the virgin PMMA surface and the POSS-MA coated surface and the samples were covered with acetone, a known solvent for PMMA. Optical microscope video images of the dots revealed their delamination from the surface and image analysis was used to determine the time that it took for the dots to be undercut – typically in the range of seconds to minutes. An obvious increase in the time required to undercut the Au was observed for the POSS-MA treated surface. A model explaining the improved adhesion will be discussed as will future plans for device fabrication.

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