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Resonant Infrared Matrix Assisted Pulsed Laser Deposition of Polymers: Improving the Morphology of As-Deposited Films[1] DANIEL BUBB, Rutgers-Camden, MICHAEL PAPANTONAKIS, Naval Research Laboratory, BRIAN COLLINS, ELIJAH BROOKES, JOSHUA WOOD, ULLAS GURUDAS, Rutgers-Camden — Resonant infrared matrix assisted pulsed laser deposition has been used to deposit thin films of PMMA, a widely used industrial polymer. This technique is similar to conventional pulsed laser deposition, except that the polymer to be deposited is dissolved in a solvent and the solution is frozen before ablation in a vacuum chamber. The laser wavelength is absorbed by a vibrational band in the frozen matrix. The polymer lands on the substrate to form a film, while the solvent is pumped away. Our preliminary results show that the surface roughness of the as-deposited films depends strongly on the differential solubility radius, as defined by Hansen solubility parameters of the solvent and the solubility radius of the polymer. Our results will be compared with computational and experimental studies of the same polymer using a KrF (248 nm) laser. The ejection mechanism will be discussed as well as the implications of these results for the deposition of smooth high quality films.

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