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Mass Spectrometry of 3D-printed Materials in Vacuum W.F. RIVERA, C.A. ROMERO-TALAMÁS, E.M. BATES, W. BIRMINGHAM, University of Maryland Baltimore County — We present the design and preliminary results of a mass spectrometry system to assess vacuum compatibility of 3D-printed parts. The setup consists of a vacuum chamber with a residual gas analyzer (RGA), a radiation heater, and windows for optical measurements of samples. The signal from the RGA is analyzed by creating a system of equations from the calibration signal from a large number of molecular spectra (the so-called cracking patterns). The equations are then inverted to find the most likely true elements in the chamber. The setup can be used as a stand-alone system, or attached to another vacuum chamber at higher pressure using differential pumping. The latter mode will be used in the Dusty Plasma Experiment at UMBC, since many of the plasma facing parts are 3D-printed. Mass spectra of electroplated plastic parts, which have a much better vacuum compatibility than non-plated plastic parts, is also obtained and compared to those without electroplating.

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