Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Study of gas-phase chemistry in a hot-wire chemical vapor deposition reactor with trimethylsilane and hexamethyldisilane[1] BRETT EUSTERGERLING, XINMAO LI, YUJUN SHI, University of Calgary — Gas-phase chemistry involved in the decomposition of trimethylsilane and hexamethyldisilane (HMDS) on a hot tungsten filament and the secondary gas-phase reactions in a HWCVD reactor has been studied using vacuum ultraviolet laser single photon ionization in tandem with TOF-MS. On the hot W filament, trimethylsilane is decomposed into $(CH_3)_2HSi$ and CH_3 radicals and HMDS is decomposed into $(CH_3)_5Si_2$, CH_3, and $(CH_3)_3Si$ radicals. Biradical combination reactions among primary radicals and those later formed are found to be the main gas-phase reaction pathways in the reactor for both precursors. Characteristic reactions of trimethylsilane are those with $(CH_3)_2HSi$ and $(CH_3)_2HSiCH_2$ radicals directly or indirectly involved, resulting in the formation of peaks at m/z = 88, 118, 132, 146, 116 and 130. With relatively heavier radicals generated from the decomposition of HMDS, the characteristic reactions for HMDS are believed to be those producing peaks in higher mass region, such as peaks at m/z = 204, 218, 262, 276, and 290.

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Date submitted: 05 Feb 2007 Electronic form version 1.4