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Development of laser ionization methods and its application in the investigation of chemical vapor deposition chemistry

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Laser ionization mass spectrometry is a powerful diagnostic tool for a variety of applications including biomedical research, drug delivery, atmospheric chemistry, and chemical vapor deposition chemistry. Our laboratory has developed several complimentary ionization methods, including the non-resonant single photon ionization (SPI) with a vacuum ultraviolet (VUV) laser radiation of 118 nm (10.5 eV) and the laser induced electron ionization (LIEI) for the diagnosis of the decomposition chemistry of precursor molecules in the process of hot wire chemical vapor deposition (HWCVD). In this work, results from our investigation on the decomposition of orgaosilicon molecules on heated tungsten and tantalum wires will be reviewed. A common decomposition pathway of forming methyl radicals has been demonstrated for methy-substituted silane molecules and methyl-substituted four-membered-ring silacyclobutane compounds. The formation mechanism and the activation energy for this pathway will be presented in this work. For the four-membered-ring organosilicon precursors, additional decomposition channels were also found from the ring-opening reactions to form alkene and silenes. The investigation of the decomposition chemistry of organosilicon molecules on heated metal wires provides helpful and important insights in understanding the secondary gas-phase reactions in HWCVD processes and also the surface reactions on the metal catalysts.

Biography

Yujun Shi obtained her PhD in Chemistry from the University of Western Ontraio (now Western University) in Canada. She did Post-doctoral work at the National Research Council (NRC) of Canada in Ottawa on an NSERC Visiting Fellowship. She is currently an Associate Professor in the Department of Chemistry at the University of Calgary. She has published more than 50 papers in referred journals and has been serving as an Editorial Board Member for *Canadian Journal of Chemistry* (Associate Editor) and *Frontiers in Physical Chemistry Chemical Physics*.

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