LASER SPECTROSCOPIC DETECTION OF THE JET-COOLED $SnCH_2$ MOLECULE

TONY SMITH, *New Product Development (NPD), Ideal Vacuum Products , ALBUQUERQUE, New Mexico, USA*; MOHAMMED GHARAIBEH, *Department of Chemistry, University of Jordan, Amman, Jordan*; DENNIS CLOUTHIER, *Department of Chemistry, University of Kentucky, Lexington, KY, USA*.

The stannylidene ($SnCH_2$) molecule has been detected for the first time in the gas phase by supersonic expansion/laser spectroscopy. This transient molecule was produced in an electric discharge through a dilute mixture of tetramethyltin [$(CH3)_4Sn$] in high-pressure argon and studied by laser induced and dispersed fluorescence through the $\tilde{B}\ ^1B_2$ - $\tilde{X}\ ^1A_1$ transition. The vibronic energy levels of the ground and excited states have been measured for both $SnCH_2$ and $SnCD_2$. The observed vibrational frequencies, partially resolved rotational band contours, deuterium isotope shifts, and electronic excitation energies are in accord with our predictions from ab initio calculations. This novel species has an unusual tin-carbon double bond in the ground state. It is the third in the series of $X{=}CH_2$ (X = Si, Ge and Sn) group IVA vinylidene species we have been able to produce and study in the gas phase.