LABORATORY DETECTION OF LINEAR SiC$_n$S (n=2-4, 6)

M. E. SANZ, M. C. McCARTHY, Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge, MA 02138 and Division of Engineering and Applied Sciences, Harvard University, 29 Oxford St., Cambridge, MA 02138, USA; P. BOTSWINA, Institut für Physikalische Chemie, Universität Göttingen, Tammannstr. 6, D-37077 Göttingen, Germany; AND P. THADDEUS, Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge, MA 02138 and Division of Engineering and Applied Sciences, Harvard University, 29 Oxford St., Cambridge, MA 02138, USA.

The linear singlet chains SiC$_2$S, SiC$_4$S and SiC$_6$S, as well as the triplet SiC$_3$S, have been detected among the products of a laboratory discharge on the basis of high level coupled cluster ab-initio calculations and characterized by Fourier transform microwave spectroscopy. The molecules were generated in a supersonic expansion of diluted mixtures of silane, diacetylene and carbon disulfide in Ne. Their rotational and centrifugal distortion constants were accurately determined, as was the spin-spin coupling constant $\lambda$ for triplet SiC$_3$S. The microwave spectra of the $^{29}$Si, $^{34}$S and both $^{13}$C isotopic species of SiC$_2$S were measured, allowing a determination of the individual bond lengths. In addition, several satellite lines were observed near the rotational transitions of SiC$_2$S, which were identified as belonging to different bending and stretching vibrational excited states.