CHARACTERIZATION OF SILICON SULFIDES BY CHIRPED-PULSE ROTATIONAL SPECTROSCOPY

MICHAEL C. McCARTHY, KYLE N. CRABTREE, OSCAR MARTINEZ, JR., *Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, and School of Engineering and Applied Sciences, Harvard University, 29 Oxford Street, Cambridge, MA 02138*.

Chirped-pulse Fourier transform microwave spectroscopy is used to characterize the electrical discharge products that are formed in a supersonic molecular beam through a dilute gas mixture of silane and hydrogen sulfide. The spectrum between 6 and 18 GHz is dominated by SiS: more than 175 transitions have been assigned to either its isotopic species, its vibrationally excited states, or both, on the basis of previous cavity measurements. Owing to the flat instrument response function and extensive vibrational excitation that has been observed, it is possible to derive a precise vibrational temperature for SiS, and determine the relative abundances of SiS, HSiS, and H_2SiS. Although rotational lines from more than 15 other silicon or sulfur molecules have been identified in the same discharge, more than 50% of lines that have been detected with a signal-to-noise ratio of three or greater are presently unassigned. Attempts to assign these many remaining lines, and efforts to benchmark the performance of our spectrometer will be highlighted as well.