A LASER-INDUCED FLUORESCENCE SPECTROSCOPY STUDY OF RHODIUM MONOSULFIDE

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Jet-cooled RhS molecules have been generated in a laser-ablation molecular beam source using Rh and CS_2. Laser-induced fluorescence spectra have been surveyed between 410 nm and 750 nm at medium resolution and the three most prominent subbands, at 539.1 nm, 551.6 nm and 553.0 nm, have been recorded at high resolution. The subbands at 539.1 nm and 551.6 nm share a common lower state while the 551.6 nm and 553.0 nm subbands share an upper state which is perturbed. The transition is shown to be of $\Pi - X^4\Sigma^-$ (a) type, where the second-order spin-orbit parameter, λ , in the ground state is estimated to be 12 cm^{-1}. Vibrational information on the ground state has been obtained by dispersed fluorescence. The RhS ground state is most probably derived principally from the $\delta^4\sigma^1\pi^2$ configuration, as is the case in the corresponding RhO. The bonding trends in RhP, RhS and RhCl parallel observations in RhN, RhO and RhF.