FOURIER TRANSFORM INFRARED EMISSION SPECTROSCOPY OF NEW SYSTEMS OF NiS

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The emission spectrum of NiS has been investigated in the $2000 - 7000$ cm^{-1} region using a Fourier transform spectrometer. The bands observed in the $3000 - 5000$ cm^{-1} region have been assigned to a new $^3\Pi - X^3\Sigma^-$ transition analogous to the $A^3\Pi - X^3\Sigma^-$ electronic transition of NiO [Ram and Bernath, J. Mol. Spectrosc. 155, 315-325 (1992)]. The $0 - 0$ band consists of $^3\Pi_{0+} - X^3\Sigma^-_1$ (4399 cm^{-1}), $^3\Pi_{0-} - X^3\Sigma^-_1$ (4257 cm^{-1}), $^3\Pi_1 - X^3\Sigma^-_{0+}$ (3939 cm^{-1}), and $^3\Pi_2 - X^3\Sigma^-_1$ (3325 cm^{-1}), all of which have been rotationally analyzed along with additional $1 - 0$, $0 - 1$ and $1 - 2$ bands of the $^3\Pi_1 - X^3\Sigma^-_{0+}$ sub-band. To higher wavenumbers, the $1 - 0$, $0 - 0$ and $0 - 1$ bands of the $^3\Pi_1 - X^3\Sigma^-_{0+}$ sub-band of another $^3\Pi - X^3\Sigma^-$ transition have been observed and rotationally analyzed. The other sub-bands associated with this transition have not yet been identified because of their very weak intensity. The present spectroscopic constants for the ground state agree well with the values reported from the microwave study [T. Yamamoto et al., Phys. Chem. Chem. Phys. 9, 3744-3748 (2007)].