NEAR INFRARED LASER SPECTROSCOPY OF NiI

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Laser induced fluorescence spectrum of NiI in the near infrared region 714 - 770 nm has been recorded and analyzed. Eleven bands belonging to four electronic transition systems have been observed: the (0,0), (1,0), and (2,0) bands of [13.3] $^2\Sigma^+$ - A $^2\Pi_{3/2}$ system; the (0,0), (1,1) and (0,1) bands of [13.9] $^2\Pi_{3/2}$ - X $^2\Delta_{5/2}$ system; the (0,0) and (1,0) bands of [13.9] $^2\Pi_{3/2}$ - A $^2\Pi_{3/2}$ system; and the (0,0), (1,1) and (0,1) bands of the [14.0] $^2\Phi_{7/2}$ - X $^2\Delta_{5/2}$ system. Spectra of isotopic molecules confirmed the vibrational quantum number assignment of the observed bands. Least squares fit of observed rotational lines yielded accurate molecular constants for the [13.3] $^2\Sigma^+$, [14.0] $^2\Phi_{7/2}$ and the A $^2\Pi_{3/2}$ electronic states of NiI. Hot band transition from the v = 1 level of the X $^2\Delta_{5/2}$ state gives $\Delta G_{1/2}$ = 276.67 cm^{-1}. The A $^2\Pi_{3/2}$ state was determined to be only 163.85 cm^{-1} above the X $^2\Delta_{5/2}$ state.