

LASER SPECTROSCOPY OF CoI AND NiI

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CoI and NiI molecules were produced in a supersonic free jet expansion in argon by the reaction of laser ablated cobalt and nickel atoms with methyl iodide (CH₃I) respectively. High resolution laser induced fluorescence (LIF) spectra of CoI and NiI have been obtained using cw single frequency ring Ti:sapphire and ring dye lasers. Four electronic transitions bands of CoI, in the near infrared region (12000 – 13000 cm⁻¹), have been observed. Preliminary analysis shows that these bands are of $\Omega' = 5$ and $\Omega'' = 4$. The ground state of CoI is tentatively assigned as $^3\Phi_4$ state. Partially resolved hyperfine structure conformed to case a_β coupling scheme has been observed. This hyperfine effect has been ascribed to the $\Omega'' = 4$ component. Electronic transitions of NiI in the near infrared and visible regions have been studied. Our analysis shows that the recorded spectra belong to two band systems namely : [14.6] $^2\Delta_{5/2} - X^2\Delta_{5/2}$ and [13.9] $^2\Pi_{3/2} - X^2\Delta_{5/2}$. Transition lines from both isotopic molecules: ^{58}NiI and ^{60}NiI are recorded and analyzed. Partially resolved hyperfine structure has also been observed at low J lines. This work represents the first experimental investigation of the spectra of CoI and NiI.