

DISPERSED LASER INDUCED FLUORESCENCE OF METALLIC MOLECULAR IONS. IDENTIFICATION OF NEW LOW-LYING ELECTRONIC STATES OF TiCl^+ AND TiF^+

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The dispersed laser-induced fluorescence technique has been applied for the first time to metallic molecular ions. The TiCl^+ and TiF^+ ions were produced by a high-voltage discharge in helium with traces of TiCl_4 or TiF_4 , respectively. A c.w. dye-laser and a grating spectrometer were used to record low-resolution spectra of these species in the visible region. This led to the observation of new low-lying electronic states of these ions: the $C^3\Pi$ ($\sim 1535 \text{ cm}^{-1}$) state of TiCl^+ , the $B^3\Delta$ ($\sim 2040 \text{ cm}^{-1}$) and $C^3\Pi$ ($\sim 2200 \text{ cm}^{-1}$) states of TiF^+ . The identification of these new states contributes to a better characterization of the first 3000 cm^{-1} of the energy level diagram of these molecules. The experimental position of the $C^3\Pi$ state of TiCl^+ is in good agreement with theoretical predictions given by a Ligand Field Theory model.^a We have extended these calculations to the TiF^+ isovalent ion, taking advantage of the new experimental data. Both experimental and theoretical new results presented here are expected to help future high-resolution investigations on these species.

^aC. Focsa, M. Bencheikh, and L. G. M. Pettersson, *J. Phys. B: At. Mol. Opt. Phys.* **31**, 2857-2869 (1998).