

ELECTRONIC SPECTROSCOPY AND PHOTOIONIZATION OF LiBe

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Heterodimers consisting of an alkaline and alkaline-earth metal, such as LiBe are plausible candidates for laser cooling experiments. Once cooled, the unpaired electron on the lithium allows LiBe to be manipulated by both magnetic and electric fields. The electronic structure calculations of You et. al¹ predicted that the $2^2\Sigma^+$ transition is very diagonal, with a 0-0 band Franck-Condon factor of 0.998. Prior to the present study, only the $2^2\Pi - X^2\Sigma^+$ bands (labeled as the C-X system in earlier literature)² had been observed between 19,200 – 20,600 cm^{-1} . We have subsequently extended the spectroscopic characterization of LiBe and recorded the first experimental data for LiBe⁺. Included in this work are the first observations of the $1^2\Pi$, $2^2\Sigma^+$, $3^2\Sigma^+$, and $4^2\Pi$ states of LiBe, and the $X^1\Sigma^+$ ground state of LiBe⁺. Data for the $2^2\Sigma^+ - X^2\Sigma^+$ transition confirmed the theoretical prediction that LiBe is a promising candidate for laser cooling.

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2. Schlachta, R.; Fischer, L.; Rosmus, P.; Bondybey, V.E. The simplest heteronuclear metal cluster lithium-berllium (LiBe). *Chem. Phys. Lett.* 170 (5-6), 485-91 (1990).