PREDISSOCIATION STUDIES IN RYDBERG STATES OF CALCIUM MONOCHLORIDE

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Recent experimental results from our continuing study of the Rydberg states of Calcium Monochloride will be summarized.[a,b] At last year's Symposium, results were presented with regard to the predissociation of $^2\Sigma^+$ states in the n* = 3-7 region.[c] The potential energy curve of the $^2\Sigma^+$ repulsive state responsible for these predissociations was quantitatively determined by direct observations of line broadening in the n*=6-7 region via REMPI and ion-dip techniques and qualitatively determined in the n*=3-5 region by OODR fluorescence detection. Unanswered questions propelled further REMPI studies of the low-n* region (n*=3-5), which is expected to be extensively predissociated by $^2\Sigma^+$ and possibly $^2\Pi$ repulsive states. Preliminary results indicate the presence of three unobserved members of two known core-penetrating $^2\Sigma^+$ Rydberg series (n* = 3.50, 3.77, 4.50) as well as the resonant detection of predissociation by TOF measurements measuring the atomic Ca photofragment channel. Further experiments in this n* region should determine the potential energy curve of the $^2\Pi$ repulsive state as well as several new members of the two known $^2\Pi$ Rydberg series.

[a] J. Li, Y. Liu, D. B. Moss, C. M. Gittins, N. A. Harris, and R. W. Field, J. Mol. Spec. **193**, 403 (1999).
[b] J. O. Clevenger, N. A. Harris, R. W. Field, and J. Li, J. Mol. Spec. **193**, 412 (1999).
[c] *ibid*, Presentation TB03, "53rd Ohio State Symposium on Molecular Spectroscopy", 1998.