

## VIBRATIONALLY RESOLVED NEGATIVE ION PHOTOELECTRON SPECTROSCOPY OF Nb<sub>8</sub>

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We have observed a surprisingly simple, vibrationally resolved spectrum for the bare niobium octamer cluster by photoelectron spectroscopy of mass selected Nb<sub>8</sub><sup>-</sup> anions. The clusters were prepared in a cw cathode discharge source within a liquid nitrogen cooled flow tube (0.5 Torr), and the spectra were obtained at 488 nm (2.540 eV) with an electron kinetic energy resolution of about 5 meV (40 cm<sup>-1</sup>). The measured electron affinity of 1.513(7) eV is consistent with that obtained in the earlier anion PES study<sup>a</sup>. In addition, the present spectrum exhibits a single clearly resolved vibrational progression in the transition between the ground electronic states of the anionic and neutral clusters. The frequency of this active mode is 185(15) cm<sup>-1</sup> in the neutral molecule and 160(20) cm<sup>-1</sup> in the anion, and the short progression indicates a small normal mode displacement of about 0.5 amu<sup>1/2</sup>Å. These results are discussed in the context of recently reported density functional calculations<sup>b</sup> on Nb<sub>8</sub> and Nb<sub>8</sub><sup>-</sup>.

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<sup>a</sup>H. Kietzmann, J. Morenzin, P. S. Bechthold, G. Ganteför, W. Eberhardt, J. Chem. Phys. **109**, 2275 (1998).

<sup>b</sup>H. Grönbeck, A. Rosén and W. Andreoni, Phys. Rev. A **58**, 4630 (1998); R. Fournier, T. Pang and C. Chen, Phys. Rev. A, **57**, 3683 (1998).