SYSTEMATIC INCREASE OF WATER VIBRATIONAL EXCITATION IN AR–WATER VAN DER WAALS COMPLEX

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The Ar–water van der Waals complex is one of the most studied complexes. This work focuses on new results obtained in the mid- and near-infrared. Complexes were formed in a pulsed slit supersonic jet expansion and were probed using sensitive laser-based absorption spectrometers. In this talk, I will present the rotationally resolved spectra of the Ar–water as a function of the number of vibrational quanta of excitation in the water molecule. Note that the dissociation energy of Ar–D_2O is evaluated to be below 100 cm^{-1} ($D_0 \sim 95$ cm$^{-1} \sim 12$ meV).[1] We started by probing the 1OD stretch region of Ar–D_2O, i.e. the $(\nu_1', \nu_2', \nu_3') \leftarrow (\nu_1'', \nu_2'', \nu_3'') = (0,0,1) \leftarrow (0,0,0)$ vibrational band, where ν_1, ν_2, and ν_3 are the vibrational quantum numbers of the isolated water molecule. This range is close to 30 times the dissociation energy. The spectra were assigned and observed perturbations are discussed following previous study on Ar–H_2O.[2] After making improvements on the FANTASIO experimental set-up,[3] we observed new bands in the 2OH stretch region of Ar–H_2O.[4,5] In this region, the excitation energy is approximately 77 times D_0.[6] Finally, preliminary results concerning the 3OD stretch excitation in Ar–D_2O (83 times D_0) will be presented.

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