SPECTROSCOPY OF LARGE VAN DER WAALS CLUSTERS IN HELIUM DROPLETS

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Large clusters of Ar_N and $(H_2)_N$ ($N = 0$-1500) have been prepared in He droplets. The clusters have been studied via the $S_1 \leftarrow S_0$ LIF spectra of the attached phthalocyanine (Pc) molecules. The band origin of Pc shifts towards low frequency upon increase of the cluster size. The amount of the shift was found to be $\Delta\tilde{\nu} = -400\mathrm{cm}^{-1}$ in the case when Ar atoms were captured by He droplets after pick up of Pc molecules. Two times smaller shift was obtained with the reversed order of the pick up events, indicating Pc molecules reside on the surface of the Ar clusters. On the other hand, the same shift was obtained in pH$_2$ clusters irrespective of the order of pick up, which shows Pc molecules penetrate inside the pH$_2$ clusters at low temperature of He droplets of 0.38 K.