Spectroscopic studies of different phases of $\text{RbC}_6$

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A $\text{RbC}_6$ film prepared by distillation in UHV, was investigated this film by X-ray absorption spectroscopy, valence band and core-level photoemission. The fcc phase obtained at high temperature (520 K), shows a very low spectral density at the Fermi level. When the sample is quenched to 50 K to obtain the monomer phase, a clear Fermi edge appears, indicative of a three-dimensional metallic character. A small extra component in the Rb 3d lines points to the presence of a few Rb atoms in tetrahedral sites. The Fermi edge spectral density disappears when the film is heated to 125 K to induce formation of the dimer phase. The sample was further annealed to 370 K to produce the polymer phase with double bonds linking the molecules along one crystal axis: although recent NMR measurements by Mehring et al.[1] find that the conduction electrons of this phase have a delocalized character, we could not observe a clear Fermi edge in the valence band spectra. Moreover, we could not fit the spectral intensity in the Fermi region with an exponential law which would be typical of a 1D metal. Phase purity of the sample and differences between surface and bulk electronic structure will be discussed based on the core level spectra.

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