Alkali Metal Adsorption on Freestanding Graphene Observed by Means of LEEPS Microscopy

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Abstract

The Low-Energy Electron Point Source (LEEPS) microscope is an holographic microscope based on the lens-less setup proposed originally by Dennis Gabor [1].
An ultrasharp field emission point source creates a bright divergent beam of highly coherent electrons. The electron wave elastically scattered off the sample interferes with the unscattered reference wave, forming an hologram on the detector [2]. The energy of the emitted electrons is in the range of 50-250 eV, corresponding to wavelengths of 0.17-0.08 nm.
Graphene is transparent to low-energy electrons [3] with a transparency of more than 70% per layer [4]. This property makes freestanding graphene a suitable substrate for LEEPS microscopy. Moreover, low-energy electrons are particularly sensitive to electromagnetic fields, therefore holography with low-energy electrons allows for probing related phenomena.
We present here the studies we just started on alkali metal adsorption on freestanding graphene with the LEEPS microscope. Our interest is in particular on the adsorption properties as a function of coverage and on the influence of defects or wrinkles. We will investigate as well the alkali intercalation between two graphene layers.

References

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[3] J. Y. Mutus, L. Livadaru, J. T. Robinson, R. Urban, M. H. Salomons, M. Cloutier, R. A. Wolkow, New J. Phys. **13** (2011) 063011
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Figures

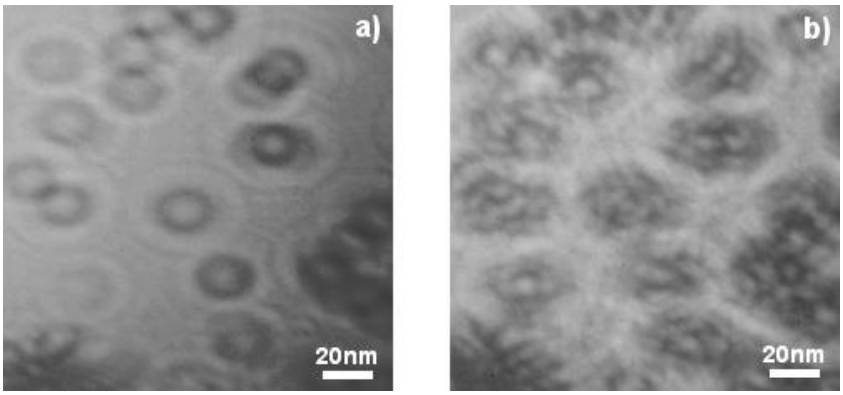

Figure 1 Holograms of freestanding graphene with adsorbates on it (a) and of the same area after cesium evaporation (b) showing Cs clusters grown around adsorbates. The magnification is 1.1×10^5 and the beam energy is 160 eV.