Superlattice of resonators on monolayer graphene created by intercalated gold Nanoclusters


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We report on a “new” type of ordering arising in a graphene monolayer when have small gold clusters are intercalated between the top monolayer graphene and the buffer layer of epitaxial graphene. We show that these clusters perturb the quasiparticles on the monolayer graphene, acting as quantum dots creating a superlattice of resonators on the graphene monolayer, as revealed by a strong pattern of standing waves. A detailed analysis of the standing wave pattern using Fourier Transform Scanning Tunneling Spectroscopy indicates that this phenomenon can arise from a strong modification of the band structure of graphene and (or) from Charge Density Waves where a significant modification of the Van Hove singularities is involved.

References


Figures:

Topographic A)-C) and dI/dV maps D)-F) of graphene in the gold cluster region for the bias voltage from +0.8 to +1.0 V (empty states) which develops a full standing wave pattern; A), D) (14 X 14 nm²) and B), C), E) and F) (12:5 X 12:5 nm²). G) and H) display a zoom of a resonators region which shows that standing waves manifest as bright protrusion with a p(2x2) reconstruction as schematized in I).