Abstract:

New low-dimensional materials such as graphene and hexagonal boron nitride (hBN) have opened up new opportunities in experimental condensed matter physics, chemistry, materials science, and biology. I will discuss recent experiments on the structural, chemical, and electronic properties of graphene and hBN, including high resolution electron microscopy where real-time dynamics of atoms, molecules, and molecular reactions are directly visualized, including those occurring in liquid. Graphene and hBN can also be used as spacers in nano-sandwiches, for which optical and perhaps chemical properties can be tuned. Recent experiments demonstrate that artificial nuclei living on graphene/hBN undergo “atomic collapse” where the conventional Bohr state is unstable and electrons spiral inward towards the nucleus.

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