

Self-Organization and Physics at Surfaces

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The purpose of the course is to describe some complex mechanisms that are at the origin of the growth of periodic structures and objects at surfaces. These include understanding the role played by supersaturation and strain in the stability of nanostructures. We will explain the formation of ultrathin films from the description of atomic phenomena and we will learn to evaluate the impact of strain on the various modes of growth in order to understand the phenomena at the origin of the 2D periodic patterning. The course intertwines experiment and theory whenever possible. Part of it will be devoted to the surface confined synthesis of organic lattices exploiting metal centers to direct the organization of molecular ligands. Examples of 2D synthesis of covalent as well as non-covalent compounds and networks of molecular building blocks will be analyzed. This approach should enable us to glimpse the fascinating challenges in the field of the nanosciences in which progress in the last decades has been truly striking. New experimental approaches as well as technical tips will be presented, featuring functional electronic, magnetic and optical properties of supramolecular networks and nanoparticles at surfaces. Basics prerequisites in physics and chemical physics are necessary.

Main topics: Structure of surfaces; Adsorption & Surface diffusion; Nucleation & growth; Epitaxy and strain; Self-organization; Molecules at surfaces; Surface confined synthesis; Self-assembly; Metal-containing supramolecular networks; Coordination compounds and covalent assembly of molecular building blocks at surfaces; Functionality and properties.

Time: 14, 21, 28 June (14:00 to 16:00) and 1st July (10:00 to 12:00), 5 July (14:00 to 16:00), 8 July 2022 (10:00 to 12:00).

Place: Auditorium IPCMS, 23 rue du Loess, Strasbourg