
O 1: Invited Talk (Rasmita Raval)

Time: Monday 10:15–11:00

Location: TRE Phy

Invited Talk

O 1.1 Mon 10:15 TRE Phy

Chirality at surfaces from the single-molecule perspective —

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Chiral surfaces are of central importance in molecular recognition, sensors, asymmetric catalysis, and optoelectronics. The nanoscale details of how chiral phenomena are nucleated, controlled and propagated in molecular assemblies at metal surfaces have begun to emerge from scanning probe microscopy, a powerful range of surface science techniques and periodic density functional theory.

This talk will outline the mechanisms that underpin mirror-symmetry breaking during self-organisation and 2D crystallisation of molecules at surfaces, leading to sophisticated outcomes e.g. segre-

gation of left-handed objects from right-handed objects, responsivity and self-adaptive behaviour. Ultimately, the chiral response of an entire molecular surface assembly can be traced back to single-molecule recognition events driven by attributes present within individual molecules, such as intrinsic chirality, skeletal distortions and the adsorption footprint placed onto the surface.

Turning to collective phenomena, we find that small population fluctuations of mirror-image molecules can lead to profound non-linearity in chiral behaviour. Further, it can be shown that, even in the absence of any chiral bias, the influence of the surface is sufficient to scramble the chiral components of a monolayer and, thus, completely break organisational mirror symmetry. Finally, the progression from supramolecular to robust, covalent chiral superstructures will be demonstrated.