Smart Chiral Frameworks
From individual to collective chirality

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Chiral organic surfaces have been intensively investigated in the last years due to their great potential for optical sensing technology. However, the very weak or absent chiroptical responses of the molecules commonly used for the construction of chiral interfaces hamper their exploitation for real devices. Moreover, the most commonly architectures are flat-lying, and, as a consequence, the substrate influence may lower versatility and molecular control. To overcome this shortcoming, up-standing chiral architectures (UCAs) are required. In this respect, chiral allenes can be used for the construction of surface-confined nanoarchitectures. Gas-phase characterization, low-temperature scanning tunneling microscopy, and molecular-dynamics simulations reveal that the dominance of molecule–molecule over molecule–substrate interactions leads to regular diastereomeric domains of UCAs. The use of enantiopure allenes with strong chiroptical responses, along with the post-synthetic modification possibilities of these UCAs, open great possibilities for the construction of new smart materials that could be implemented into sensors or optically-driven logic gates.