

# Compensation of distinct chiral forces: A proof of concept in soft matter-based self-assembly

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Chirality, the absence of mirror symmetry, can be equally invoked in relation to physical forces and chemical induction processes, yet a competition between these two types of influences is rarely reported. I will focus on Langmuir monolayers of azobenzene surfactants as a prototypical self-assembled two-dimensional system in which chiral selection is controlled by the combined independent action of a chiral dopant and vortical stirring. The two effects can be arbitrarily coupled, either constructively or destructively, leading to a situation of perfect compensation. The induced enantiomorphous excess is measured in terms of the statistical imbalance of an ensemble of sub-millimeter monolayer domains, where

achiral molecules self-assemble with a well-defined orientational chirality, which is unambiguously resolved using Brewster angle microscopy. The observed phenomenon is interpreted in terms of the intervening effect of vortical motion in the dynamics of topological defect recombination and is further modelled in terms of a simple kinetic model.

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<sup>1</sup> N. Petit et al., Phys. Rev. Lett. 103, 237802 (2009)

<sup>2</sup> N. Petit et al., Nat. Commun. 3:1001  
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