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Biogenic twinned crystals exhibiting unique morphological symmetry ANNA HIRSCH, DVIR GUR, BEN PALMER, LIA ADDADI, LESLIE LEISEROWITZ, LEEOR KRONIK, Weizmann Institute of Science, Rehovoth —
Guanine crystals are widely used in nature as components of multilayer reflectors. Organisms control the size, morphology, and arrangement of these crystals, to obtain a variety of optical "devices" [1]. The reflection systems found in the lens of the scallop eye and in the copepod cuticle are unique in that the multilayered reflectors are tiled together to form a contiguous packed array. In the former, square crystals are tiled to form a reflecting mirror. In the latter, hexagonal crystals are closely packed to produce brilliant colors. Based on electron diffraction, morphology considerations, and density functional theory, these crystals were shown to possess similar monoclinic crystal symmetry, which we have previously identified as different from that of synthetic anhydrous guanine [2]. However, the crystals are different in that multiple twinning about the {012} and the {011} crystallographic planes results in square and hexagonal morphology, respectively. This is a unique example where controlled twinning is used as a strategy to form a morphology with higher symmetry than that of the underlying crystal, allowing for tilling that facilitates optical functionality. [1] Gur et al., Adv. Mat. (2016) [2] Hirsch et al., Chem. Mat. 27, 8289 (2015)

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