

Twisted Crystals

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Bernauer's Bands

Ferdinand Bernauer proposed in his monograph, "*Gedrilte*" *Kristalle* (1929), that 1/4 of organic molecular crystals could be made to grow as polycrystalline spherulites with helically twisting radii that give rise to distinct bull's-eye patterns of concentric optical bands between crossed polarizers. The idea that many common molecular crystals can be induced to grow as mesoscale helices is a remarkable proposition poorly grounded in theories of polycrystalline pattern formation. Herein, the Bernauer hypothesis is re-examined using contemporary methods of analysis not available at the time, including micro-focus X-ray diffraction, electron microscopy, scanning probe microscopies, and Mueller matrix imaging polarimetry. A complementary look at comparable crystallization processes in high polymers enables us to isolate common features that give rise to remarkable crystalline morphologies. A critical analysis of competing twisting mechanisms is offered.