## Morphotropism: A Link between the Similarity and Polymorphism of Organic Crystals

<u>Alajos Kálmán</u>, Institute of Structural Chemistry, HAS Budapest, Hungary. E-mail: akalman@chemres.hu

Kitaigorodskii, in Organic Chemical Crystallography (1961) applied a term "morphotropic step" by the aid of which nonisomorphous crystals of chemically similar molecules may keep their close packing coefficient around 0.6-0.7. However, the essence of the phenomenon remained unanswered. Since 2000, an ongoing analysis of the supramolecular self-assembly of disubstituted cycloalkanes led to the discovery of nine packing patterns built up by hydrogen bonded homo- and heterochiral chains of racemic molecules, associated either antiparallel or parallel array [1]. Since every pattern is represented at least by one crystal structure (solved in Budapest), the chemical similarity and crystallographic properties of these crystals led to a recognition that these distinct patterns, by pairs, mostly differ only by one non-crystallographic turn of motifs forming a pattern, or the whole pattern turns through 180°. A proper definition of the word morphotrops helped to identify non-crystallographic turns with the morphotropic steps left unexplained by A.I.K. It has been shown that stereoisomers, in particular, are related by a morphotropic step, which may also play a bridge between isostructural crystals, and occasionally hallmarks the enantiotropic polymorphism of molecules. While a non-crystallographic turn between isostructures and stereoisomers is imaginary, polymorphs are linked by real, solvent mediated turns of the motifs.

[1] Kálmán A., Fábián L., Argay Gy., Bernáth G. Cs., Gyarmati Zs., Acta Cryst., 2004, **B60**, 755, and references therein.

Keywords: isostructurality, morphotropism, polymorphism