Defects in Atomic Structure of Decagonal Quasicrystalline Approximants

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Abstract. The present work is focused on the observation of structural defects in the arrangement of tiles in the structure of ε-family decagonal quasicrystalline approximants. The $Al_{73.5}Pd_{12}Co_{14.5}$ alloy annealed at 1035°C for 300h with majority content of the ε_n phase was investigated using scanning electron microscopy and scanning transmission electron microscopy. It was experimentally documented that the regular arrangement of particular tiles in the structural variants of ε_n can be interrupted by defects. The occurrence of defects resulted in the formation of new types of tiles, e.g. the rhombus-tile. Enhanced diffusion of atoms during the annealing was disclosed as a supporting factor for the formation of these defects.

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