

Structure of framboidal pyrite: a morphological study

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The microarchitecture in pyrite framboids was investigated in detail using electron microscopy. The constituent microcrystals show a range of habit including cubes, cubo-octahedra and octahedra and display various growth features such as overgrowth, incomplete growth and hollow cores. Framboids display three types of 2-dimensional (2D) internal microcrystal arrangements: (1) single-ordered structures, (2) multiple-ordered structures; and (3) disordered structures. These 2D microcrystal arrangements observed on framboid sections respectively reflect overall 3D packing architectures: (1) cubic close packing; (2) icosahedral packing; and (3) disordered packing. Cubic close packing and icosahedral packing produce the highest space-filling efficiency with twelve nearest neighbours, which minimise the surface energy associated with both individual microcrystals and overall framboidal form. Ordered framboids approach energetically ideal states achieved by self-assembled colloidal crystals that are all equidimensional and equimorphic. The disordered framboids are considered to be formed where such minimum energy configurations are not attained.