MECHANICAL DISASSEMBLING AND TESSELLATION REASSEMBLING, TOOLS FOR UNDERSTANDING THE WIDMANSTÄTTEN STRUCTURE.

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Although the Widmanstatten structure has been studied for more than two centuries with many mechanism been proposed to explain this pattern, there is still much about this transformation that is not well understood. The EBSD and use of orientation mapping techniques applied to meteorites [1-3] has proved very useful in better understanding of its crystallographic interrelations.

The three-dimensional (3-D) microstructural analyses provides a new insights into the widmansttätten pattern transformations not aboarded previously by any two-dimensional (2-D) techniques.

Tessellations or tilling, the repeating arrangements of crystallographic solids, combined with the x-ray crystallography techniques in special electron backscatter diffraction (EBSD) is a very powerful tool for three-dimensional characterization of the materials. The tessellation can help on understand of the intricate arrangement of bars, needles, plates and lath shapes lamellae of widmanstätten pattern on meteorites.

A recently arrived sample for identification at Museu Nacional/UFRJ, found in Descoberto, MG, probably another mass of São João Nepomuceno, an anomalous IVA silicate rich iron, exhibits near the surface plates so loose that can easily be disassembled and broken into interpenetrating triangle plates, acute rhombic prisms and tetrahedrons in steady of the expected octahedrons.

The sample has been studied by stereo and metallographic microscope, electron microprobe, crystallographic macrotexture optical goniometer and microtexture by x-ray diffraction and EBSD.

The Kepler's *Stella Octangula* (an octahedron with a tetrahedron on every face) in a cubic unitcell, which is also a compound of two tetrahedras from the fcc cubic alternating vertices is the cell observed in steady of expected octahedric fcc cubic cell. These structure could also been present in the high-pressure phases in the closest packing cubic or hexahedral cells.

The goal of the use of tessellation is to link the observed 3D morphology and crystallography compared with other techiniques concerning 3D in 2D observations, providing new insights into the widmanstatten formation mechanism.

The tessellation of a tetrahedron is formed by tetra-hedrons plus rhombohedrons (a combination of tetrahedra and octahedra). In a tetrahedral site the interstitial is in the center of a tetrahedra formed by four lattice atoms. Three atoms, touching each other, are in plane; the fourth atom sits in the symmetrical position on top.

It is therefore of interest to raise the question of whether the crystallographic data gathered in the (taenite + kamacite) region on the one hand and the plessite regions on the other can improve our understanding of the transformation mechanisms that govern the formation of these microstructures.

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