Type IIa diamonds: micromorphology after etching

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The micromorphology of the type IIa diamonds (Mir pipe, Yakutia), which were earlier resorbed in an experiment (1 GPa, in presence of various ions and media), is studied. High resolutions technique (Field-Emission SEM and Atomic Force Microscopy) was used. It is shown that for the considered samples the characteristic features of the internal texture (blocky, mosaic texture, strong deformation, multiple growth centers, non-concentric zonation) is revealed in etching up to 80% of the mass loss, proving the presence of such a texture within the whole volume. A set of subgrains, parallel oriented and located at different levels, were observed. For some samples, we observed splitting into blocks with preservation of local orientation (40–30 μm sites), as well as a possible revealing of multiple growth centers (on 10 μm sites). At resolutions of 5–1 μm, outcrop of columnar individuals approximately of equal size and of a sawtooth profile, which are in close accrete, was observed. Some subinividuals in turn are split into smaller parts, which are combined into separate blocks that are disoriented relative to each other. At higher resolution in areas of 30–10–5 μm in size, an outcropping of the growth phases was observed, which we interpreted as the beginning of the development of sub-individuals at the boundaries of neighboring growth sectors. Block-mosaic surface is characterized by disorientation of the blocks, but with preservation of the orientation of the subindividuals in them. At high etching rates, dramatically corroded areas with cracks, caverns, irregularly etched surfaces of protruding sub-individuals appeared. At low etching rates, flat-buttomed trigons had cracks (such transformations of trigons were not previously noted). We associate all the features noted above with the blocky texture of type IIa diamonds, which, in turn, in our opinion, is determined by the splitting growth mechanism under high local stresses.