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Studying the Internal Structure of Native Gold Using the EBSD Method

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The internal structure of placers gold was studied using the EBSD method to determine changes in its structure under exogenous conditions.

Samples were collected from placers in the Middle and Southern Urals and Eastern Kazakhstan, associated with gold-quartz type deposits.

Aggregates of placer gold are characterized by a granular structure; single crystals are less common. Grains with a size of 30-300 μm have an isometric shape and smoothly curved boundaries. Particles from short-distance diluvial placers are practically not deformed and have not experienced significant exogenous changes. The degree of disruption of the primary structure of gold increases as placers move away from the primary sources. Plastic deformations are expressed by large zones of misorientation of the crystal structure and twining. An important feature of gold grains that have experienced deformation during transportation is the development of high-purity gold rims in the peripheral zones of the particles. The rims have a fine-crystalline mosaic structure and are composed of polyhedral grains of pure gold. The thickness of the rims usually does not exceed 10-30 μm. The rims are homogeneous in structure and lack signs of deformation, while the core parts are significantly deformed.

The regular increase in the number of plastic deformations of gold with increasing distance from the lode source confirms the logical assumption that the main reason for the deformation of placer gold is transportation in a hydrodynamic environment. The fine-grained mosaic structure of gold rich rims, the absence of deformations of the grains composing them indicate the formation of rims as a result of recrystallization of deformed zones of native gold aggregates, accompanied by the removal of impurities.