

METAL MEMBRANES ON NATURAL DIAMONDS

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Thin metal membranes have been discovered on curved-face diamonds from the Ichetju deposit (Middle Timan). Productive horizon of the deposit is a gravelstone seam 40-60 cm thick lying in D₂ sandstones widespread in the area. Together with diamonds, there are concentrations of Au, TR and rare metals.

Electron microscope investigation (JSM-6400, Link Isis-300) disclosed unusual metal membranes on the surface of about 40% of the studied crystals. The membranes are very thin (0.1-2 mcm) and varied in composition. Fourteen types of metal and intermetallic membranes have been established: Au, Ag, Fe, Ti, Pb, Sn, Bi, Ta, Au-Ag, Pd-Au, Fe-Cr, Fe-Cr-Ni, Cu-Sn, Cu-Zn which are better preserved on the crystal surface in negative relief forms. The metal membranes on natural diamonds are similar in morphology and, in some cases, in composition to metal membranes on synthetic diamonds. The fact that the membranes cover only fragments of the surface (not more than 30%) and indications of the metals' transformations to other mineral phases suggest aggressive environments during diamond transportation from the mantle. So, part of the membranes, especially on flat face crystals, must have been destroyed.

This discloses the mechanism of diamond formation in nature - growth from solution in metal melt (*graphite* → *Me* → *diamond*). The metal membrane needs to be only a few microns thick for the natural synthesis *graphite* - *diamond* to occur. Data on the composition of the natural metal membranes on diamonds can be used for creating new mixture formulas in artificial diamond synthesis. The metal membranes and face sculpture are interpreted as an evidence in favor of the growth rather than the dissolution origin of curved-face diamonds.