

Why Tolbachik diamonds cannot be natural

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ABSTRACT

Taking into account recent publications, we provide additional comprehensive evidence that type Ib cuboctahedral diamonds and some other microcrystalline diamonds from Kamchatka volcanic rocks and alluvial placers cannot be natural and undoubtedly represent synthetic materials, which appear in the natural rocks by anthropogenic contamination. The major arguments provided in favor of the natural origin of those diamonds can be easily disproved. They include the coexistence of diamond and deltalumite from Koryaksky volcano; coexistence with super-reduced corundum and moissanite, Mn-Ni silicide inclusions, F-Cl enrichment and F/Cl ratios, and carbon and nitrogen isotopes in Tolbachik diamonds, as well as microtwinning, Mn-Ni silicides, and other inclusions in microcrystalline diamond aggregates from other Kamchatka placers. We emphasize the importance of careful comparison of unusual minerals found in nature, which include type Ib cuboctahedral diamonds and super-reduced phase assemblages resembling industrial slags, with synthetic analogs. The cavitation model proposed for the origin of Tolbachik diamonds is also unreliable since cavitation has only been shown to cause the formation of nanosized diamonds only.

Keywords: Diamond, Kamchatka, metal catalyst, silicide, super-reduced phases, cavitation, HPHT synthesis