

Genesis and depth of formation of ferropericlase inclusions within Super-Deep Diamonds

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Diamonds containing fluid and mineral inclusions are the only natural samples that allow us to probe the deepest portions of Earth's mantle to ~800 km depth. In order to interpret the information they provide, it is important to understand the growth relationships between diamonds and inclusions and to evaluate the depths at which the inclusions were trapped. Ferropericlase $[(Mg,Fe)O]$ is the most common inclusion within superdeep diamonds (those forming at > 300 km depths). However, due to discrepancies between experimental and natural data about this mineral, the origin of ferropericlase-bearing diamonds remains controversial. Here we present the results of single-crystal X-ray diffraction analyses on a set of ferropericlase inclusions in superdeep diamonds from Juina (Brazil) and Kankan (Guinea). Based on inclusion-host crystallographic orientation relationships and to elastic geobarometry, we assessed the most likely scenario for the genesis of ferropericlase-diamond pairs.