Replicate mantle diamonds

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Still today, diamond growth in the mantle is difficult to understand. It may implicate different processes but there is an agreement to involve fluids as diamonds parents. The composition of these fluids is supposed to be variable depending of the the settings and depths. Natural diamonds also exhibit dissolution features, possibly mantle-derived and not only due to kimberlite-induced resorption during magma ascent [1]. We present experimental results devoted to understand diamond growth versus dissolution mechanisms in the lithosphere. Experiments are performed using multi-anvil presses at 7 GPa, 1300-1675°C for a few hours (4 to 27 hrs). As starting materials we use mixtures of water, carbonates, natural lherzolite or MORB, graphite and diamonds seeds resulting in hydrous-carbonate-silicate fluids at high pressure and temperature. For similar pressure and temperature conditions, results show that diamonds are formed or dissolved in these fluids, depending on the redox conditions. Focussed ion beam preparations of the diamonds evidence that when they grow, they trap multi-phased inclusions similar to those observed in fibrous, coated and monocrystalline natural diamonds, in agreement with previous studies [2-4].

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