Natural nanodiamonds in oceanic rocks

October 16 2020

The fluid inclusions inside the olivine contain nanodiamonds, apart from serpentine, magnetite, metallic silicon and pure methane. Credit: University of Barcelona

Natural diamonds can form through low pressure and temperature geological processes on Earth, as stated in an article published in the journal *Geochemical Perspectives Letters*. The newfound mechanism, far from the classic view on the formation of diamonds under ultra-high pressure, is confirmed in the study, which draws on the participation of experts from the Mineral Resources Research Group of the Faculty of Earth Sciences of the University of Barcelona (UB).

Other participants in the study are the experts from the Institute of Nanoscience and Nanotechnology of the UB (IN2UB), the University of Granada (UGR), the Andalusian Institute of Earth Sciences (IACT), the Institute of Ceramics and Glass (CSIC), and the National Autonomous University of Mexico (UNAM). The study has been carried out within the framework of the doctoral thesis carried out by researcher Núria Pujol-Solà (UB), first author of the article, under the supervision of researchers Joaquín A. Proenza (UB) and Antonio García-Casco (UGR).

Diamond: The toughest of all minerals

A symbol of luxury and richness, the diamond (from the Greek αδ?μας, "invincible") is the most valuable gem and the toughest mineral (value of 10 in Mohs scale). It is formed by chemically pure carbon, and according to the traditional hypothesis, it crystalizes the cubic system under ultra-high-pressure conditions at great depths in the Earth's mantle.

The study confirms for the first time the formation of the natural diamond under low pressures in oceanic rocks in the Moa-Baracoa Ophiolitic Massif, in Cuba. This great geological structure is in the north-eastern side of the island and is formed by ophiolites, representative rocks of the Oceanic lithosphere.

These oceanic rocks were deposited on the continental edge of North

America during the collision of the Caribbean oceanic island arch, between 70 and 40 million years ago. "During its formation in the abysmal marine seafloors, in the cretaceous period—about 120 million years ago—these oceanic rocks underwent mineral alterations due to marine water infiltrations, a process that led to small fluid inclusions inside the olivine, the most common mineral in this kind of rock," notes Joaquín A. Proenza, member of the Department of Mineralogy, Petrology and Applied Geology at the UB and principal researcher of the project in which the article appears, and Antonio García-Casco, from the Department of Mineralogy and Petrology of the UGR.

"These fluid inclusions contain nanodiamonds of about 200 and 300 nanometres, apart from serpentine, magnetite, metallic silicon and pure methane. All these materials have formed under low pressure (

Citation: Natural nanodiamonds in oceanic rocks (2020, October 16) retrieved 6 May 2024 from https://phys.org/news/2020-10-natural-nanodiamonds-oceanic.html