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Rigaku X-ray Diffraction Instrumentation Enables Characterisation of Blue Diamond Inclusions from Earth's Lower Mantle

X-ray crystallography technology from Rigaku Oxford Diffraction was instrumental in a recent study of boron-bearing diamonds at mantle depths

August 10, 2018 – The Woodlands, TX. Rigaku Corporation would like to congratulate authors Evan M. Smith (*Gemological Institute of America, New York, NY, USA*), Steven B. Shirey (*Department of Terrestrial Magnetism, Carnegie Institution for Science, Washington, DC, USA*), Stephen H. Richardson (*Department of Geological Sciences, University of Cape Town, Rondebosch, South Africa*), Fabrizio Nestola (*Department of Geosciences, University of Padova, Padua, Italy*), Emma S. Bullock (*Geophysical Laboratory, Carnegie Institution for Science, Washington, DC, USA*), Jianhua Wang (*Department of Terrestrial Magnetism, Carnegie Institution for Science, Washington, DC, USA*), and Wuyi Wang (*Gemological Institute of America, New York, NY, USA*) on their recent front cover article published in the August 2nd edition of Nature, a leading weekly, international scientific journal.

The research letter, entitled "*Blue boron-bearing diamonds from Earth's lower mantle*," features a study of diamond inclusions in blue type IIb diamonds. The blue tinted diamonds, a famous example of which is the Hope diamond, get their color from boron impurities, which also impart semiconductivity. The conspicuous existence of blue boron-bearing diamonds reveals that boron, an element abundant in the continental and oceanic crust, is present in certain diamond-forming fluids at mantle depths. The source of the boron and the geological setting of diamond crystallization, however, were heretofore unknown. The paper shows that boron-bearing diamonds carry previously unrecognized mineral assemblages whose high-pressure precursors were stable in metamorphosed oceanic segments of the earth's crust and upper mantle at depths reaching the lower mantle.

The X-ray crystallographic component of the research was carried out using a Rigaku SuperNova X-ray diffractometer with a Dectris PILATUS P200K hybrid pixel array detector. The SuperNova single-crystal diffractometer from Rigaku Oxford Diffraction (ROD) incorporates a microfocus sealed tube X-ray source and a fast, high-precision kappa goniometer. The small microfocus beam allowed the researchers to target the diamond's 5-10 micron inclusions, enabling them to characterize them.

The full paper can be found here: https://www.nature.com/articles/s41586-018-0334-5

More information about crystallography systems from Rigaku is available at http://oxford-diffraction.com

About Rigaku Oxford Diffraction (ROD)

ROD was formed as the global single crystal business unit of Rigaku Corporation after the acquisition of the former Oxford Diffraction organization from Agilent Technologies in 2015. ROD is a leader in the field of single crystal analysis, both in the field of chemical crystallography as well as well as macromolecular crystallography. Formed in 1951, Rigaku Corporation is a leading analytical instrumentation company based out of Tokyo, Japan.

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