Poster

Masterful sample grilling starts here

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A detailed understanding of the structure-property relationship is key to designing materials with tailored properties for specific applications. Single crystal X-ray diffraction is one of the most powerful analytical methods to provide this insight. Modern science benefits from the ability to perform experiments under non-ambient conditions, typically increasing pressure and decreasing temperature.

Although obvious, measurements at very high temperatures are far less common due to the lack of suitable heating devices that are easy to install and safe to operate.

Recently, the Oxford FMB Hot Air Gas Blower heater has been integrated into the D8 VENTURE, allowing convenient and accurate measurement of single crystal X-ray diffraction data at temperatures up to 1000 °C. This greatly enhances the experimental portfolio of researchers.

Vanadinite (Pb5(VO4)3Cl) is an apatite mineral and the major industrial source of the metal vanadium and, to a lesser extent, lead. It has been reported that vanadinite undergoes a phasetransition at 23.1 GPa and 600 K,[1, 2] whereas the synthetic analog $Pb_5(VO_4)_3I$, in which chlorine is replaced by iodine, decomposes already at 540 K [3]. Investigations on different phosphate and vanadate analogs revealed phase transitions to monoclinic, pseudohexagonal phases.

We report the high-temperature measurement of a crystal of vanadinite ($Pb_5(VO_4)_3Cl$) mounted on the tip of a quartz capillary.

[1] Y. Liu et al., Minerals 2021, 11, 121.

[2] Gatta et al., Physics and Chemistry of Minerals 2009, 36, 311–317.

[3] S. Redfern et al., Mineralogical Magazine (2012) 76 (4): 997–1003.