LATTICE PARAMETER OF POLYCRYSTALLINE DIAMOND IN THE LOW-TEMPERATURE RANGE

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Keywords: thermal expansion, X-ray diffraction, diamond

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Diamond exhibits, due to strong covalent bonding, a very weak thermal expansion at low temperatures. Below room temperature, the total variation of the unit-cell dimension is less than 10^{-3} Å, being comparable to the precision of lattice-parameter determination at a typical instrument. Experimental studies have been published for diamond single crystals [1, 2], whereas detailed experimental studies for polycrystalline diamond have been reported mainly above the room temperature.

In the present study, the results of measurement of lattice parameters of commercial polycrystalline diamond will be presented. The measurements were performed using Debye-Scherrer geometry at ID31 beamline (ESRF) equipped with a bank of nine detectors preceded by Si 111 analyser crystals. Lattice parameters were calculated using the Rietveld refinement. The obtained experimental lattice parameter and thermal expansion temperature dependence will be discussed on the basis of available literature data.

References

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