SINGLE CRYSTAL ELEMENTS OF SYNTHETIC DIAMONDS FOR X-RAY OPTICS

Description
Diamond single crystals used in X-ray optics as monochromators and polarisation changers for strong X-ray synchrotron radiation.

Technical specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Diamond type</td>
<td>Ib+IaA</td>
</tr>
<tr>
<td>Area of elements</td>
<td>40-90 mm²</td>
</tr>
<tr>
<td>Thickness</td>
<td>0.5-2 mm</td>
</tr>
<tr>
<td>Dislocation density</td>
<td>10⁻¹⁰ sm⁻²</td>
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<tr>
<td>Macro- and micro inclusions</td>
<td>no</td>
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<tr>
<td>FWHM of the reflection rocking curve (220)</td>
<td>5-20 arcsec</td>
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</tbody>
</table>

Technical appraisal and economic benefits
Joint testing (by the Institute of Mineralogy and Petrography SB RAS and the Institute of Nuclear Physics SB RAS) demonstrated that diamond elements used as quarter-wave plates in X-ray synchrotron radiation provide a high degree of circular polarisation. Due to high structural perfection, extraordinary thermal properties, and low attenuation in the X-ray bandwidth, diamond single crystals is an advantageous material for X-ray optics.

Application areas
- instrument-making
- research fields

Development stage
Pilot samples successfully tested at the Institute of Nuclear Physics SB RAS, Institute of Crystallography RAS, and the University of Pyongyang (Republic of Korea).

Patent situation
Know-how protected.

Commercial offers
Production and vendor contracts.

Estimated cost
Under the contract.

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