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Title:	Thermal shaping of thin glass panels for hard X-ray telescope optics
Authors:	Navalkar, V. (/jspui/browse?type=author&value=Navalkar%2C+V.) Singh, Kulinder Pal (/jspui/browse?type=author&value=Singh%2C+Kulinder+Pal) Press, M. (/jspui/browse?type=author&value=Press%2C+M.)
Keywords:	Borosilicate glass X-ray telescope Multi-layers.
Issue Date:	2019
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Citation:	Journal of Astrophysics and Astronomy, 40(3).
Abstract:	We present a process for thermal forming of thin glass panels of borosilicate glass to produce mirror segments for X-ray telescope optics. The mirror segments are required to be shaped in a parabolic and hyperbolic shape in accordance with Wolter-I type design of X-ray telescope optics. Thermal forming of glass is a low-cost method to produce light-weight mirror segments. The process makes use of a semi-cylindrical quartz mold having surface roughness of the order of 1 nm. Flat glass sheets of 0.2 mm and 0.3 mm thickness are placed on the diametric edges of the mold. With a suitable thermal cycle, the glass sheets are thermally formed as per the shape of the mold. The shape of these formed glass sheets was measured using a non-contact optical setup. The surface quality measurements of the formed glass sheets were performed using atomic force microscope and they were found to be in the range of 0.04–0.33 nm. Once tested for acceptance, these glass sheets are coated using sputter deposition of multi-layers of high and low atomic number materials for hard X-ray reflection. Such mirror segments do not require polishing of the surface before being coated with multi-layers.
URI:	<a href="https://link.springer.com/article/10.1007/s12036-019-9592-3">https://link.springer.com/article/10.1007/s12036-019-9592-3</a> ( <a href="https://link.springer.com/article/10.1007/s12036-019-9592-3">https://link.springer.com/article/10.1007/s12036-019-9592-3</a> ) <a href="http://hdl.handle.net/123456789/2008">http://hdl.handle.net/123456789/2008</a> ( <a href="http://hdl.handle.net/123456789/2008">http://hdl.handle.net/123456789/2008</a> )
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