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X-ray wave guiding using three-beam Bragg-surface diffraction
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PEI-CI TEAM — A diffraction-type of X-ray wave guide, in contrast to refraction-
type, is proposed using three-beam diffraction geometry to generate a surface
diffracted beam propagating along the direction of the wave guide. The three-
beam Bragg-Surface diffraction involves a symmetric Bragg reflection and a surface
diffraction. The former is used to guide a wide-angle incident beam into a silicon
crystal. The simultaneously occurring surface diffraction then guides the diffracted
beam propagating along the direction of the wave guide that is parallel to the crystal
surface. A wave guide with a shallow ditch is then manufactured along the direc-
tion of the surface diffraction using the conventional lithographic technique. As a
whole the wave guide consists of a three-layer structure of tantalum/photon resist
(PMMA)/tantalum, on the Silicon substrate. The surface diffracted X-rays can then
be confined in and guided along the layer of photon resist. Details of the design of
the wave guide and synchrotron diffraction experiments will be reported.

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