

## **Bragg-Fresnel optics for high resolution x-ray diagnostic techniques at the ESRF**

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The field of Bragg-Fresnel optics (BFO) has undergone remarkable progress over the past three years, first due to a successful combination of the BFO with third-generation sources like ESRF and, second, due to significant improvements in BFO fabrication technology. The high brilliance and low emittance of the ESRF x-ray beams provide an enormous advantage in efficiency over second-generation sources in microfocusing optics. It has been demonstrated that micro- and submicrometer beams can be easily generated with BFO in the energy range from 6 to 100 keV. A coherence preservation of the beam is the specific particular feature of the BFO. Different applications for microdiffraction and microimaging studies were realized. These applications include:

- small angle scattering experiments for organic and non-organic materials;
- high resolution double crystal diffraction for semiconductor heterostructures;
- linear microprobe for superalloys stress analysis;
- fluorescence microprobe for elemental mapping.

Hard x-ray phase contrast microscopy and microtomography based on BFO are under intensive development at the present time.