Capillary discharge based soft X-ray imaging setup, using Fresnel zone plate (FZP) optics

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Abstract:

Development of soft X-ray (SXR) imaging setup based on a capillary discharge source is presented. Here the Z-pinching plasma is acting as a source of XUV radiation. A ceramic capacitor bank is pulse-charged up to 80 kV. It is then discharged through a pre-ionized gas filled (nitrogen) ceramic tube of 3.2 mm diameter, and 10 cm length. The discharge current has an amplitude of ~ 25kA. The radiation is filtered at 2.88 nm (nitrogen N VI, 1s-1s2p). Ellipsoidal mirror, coated with nickel is being employed as a condenser. Fresnel zone plate (FZP) is used as a diffractive optics lens in the SXR region, to image the sample on the BI-CCD camera. High resolution imaging of biological objects can be realized, as the working wavelength is in the water-window region. Detailed description of the setup as well as the components leading to the nano-imaging applications is outlined.