Bionanoprobe II – High-Resolution XRF Nanoprobe

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Abstract:

The second-generation Bionanoprobe (BNP-II), a hard x-ray fluorescence (XRF) nanoprobe, will be developed to deliver a spatial resolution of 10 nm or better and highest possible sensitivity down to a few atoms for trace element studies in soft materials, particularly biology and life sciences. It will enable 3D high-throughput trace elemental mapping and ultrastructure imaging at the level of small subcellular organelles. New instrument will make full use of the brightness of the APS Upgrade (APS-U) lightsource, optimized undulator and monochromator, advanced zone plate nanofocusing optics, and novel computation approaches. Cryogenic methods will be further explored to minimize radiation damage and enable imaging of frozen-hydrated biological specimens preserved as close as possible to their natural state. *In situ* confocal fluorescence light microscopy, with high numerical aperture, will be developed as part of the system, allowing 3D correlative studies on select fluorophores with specimen ultrastructure and trace element content.