Cateretê, the Coherent Scattering Beamline at Sirius

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The Cateretê beamline at Sirius, the new Brazilian synchrotron light source will be dedicated to coherent and time-resolved scattering experiments. It will provide unique capabilities, providing cutting edge research tools that are non-existent today in Brazil, like 3D imaging with nanometer resolution. X-ray photon correlation spectroscopy (XPCS) will enable to study the dynamics in hard and soft condensed matter, biological materials. Ultra-small angle X-ray scattering, with micro-second time-resolution will benefit of the low divergence and high flux of the new synchrotron source. While coherent X-ray diffraction imaging (CXDI) will allow imaging single nanocrystals at a resolution of a few nanometers in three dimensions. We will present the first synchrotron operando Bragg coherent diffraction imaging results applied on a gold@TiO₂ nanocatalyst. We imaged in three dimensions a 100 nm sized gold nanocrystal, at a resolution of several nanometers and determined its 3D strain distribution during the oxidation reaction of carbon monoxide, an important reaction in pollution control. In this talk an overview of the main characteristics and new scientific potentialities of coherent diffraction imaging, X-ray photon correlation spectroscopy and ultra-small angle X-ray scattering for studying nanomaterials, glasses, polymers, biomaterials will be provided as well as the status of the Cateretê project.