Recent Progress at the "BOREAS" Beamline 29 at the ALBA Synchrotron Light Source

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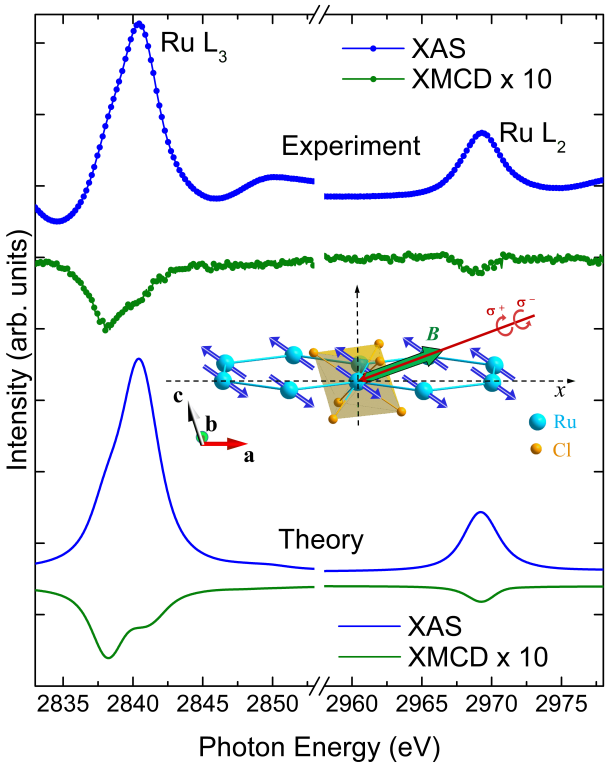
ALBA BL29, "BOREAS", is a soft X-ray beamline dedicated to polarization-dependent spectroscopic investigations of advanced materials, enabling techniques such as XAS, XMCD, XMLD, and resonant scattering & reflectivity. It delivers high flux with high resolution, so that spectra of elements with minute concentrations (i.e., 10^{-4} atomic layers) of ferromagnetic elements are routinely performed within 2-3 minutes. Typical experiments include studies of isolated TM and RE magnetic atoms at surfaces or incorporated in organo-metallic molecules or 2D materials. Samples can be prepared using *in situ* surface science capabilities, and eventually characterized using an *in situ* STM. Absorption spectra from around 80 eV up to 4 keV can be taken using circular/elliptical polarization, yielding rather exclusive opportunities at the *L*-edges of 4d and 5d transition metals. BOREAS is equipped with two state-of-the-art end-stations: The first one, is a high-field vector magnet for soft X-ray techniques such as XAS, XMCD, or XMLD. The second end station is a UHV reflectometer for complementary approaches including resonant soft X-ray reflectivity, resonant magnetic scattering, and GISAXS, under applied magnetic fields up to 2 Tesla and between 20 to 400 K. The beamline instrumentation and capabilities will be reviewed in this talk, including a few salient scientific results.



Experimental Ru $L_{2,3}$ XAS (blue circles) and XMCD (green circles) spectra of a $RuCl_3$ single crystal together with calculated XAS and XMCD spectra. The spectra were taken at $T = 2$ K and $B = 6$ T. The inset shows the orientation of the incoming photon beam with respect to the $RuCl_3$ honeycomb structure (S. Agrestini et al., Physical Review B 96, 161107(R) (2017))