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Supporting information for article:

The Inner Shell Spectroscopy Beamline at NSLS-II: a facility for *in situ* and operando X-ray absorption spectroscopy for materials research

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S1. Initial high energy-resolution spectroscopy tests at ISS

Here we present some of the first results in high energy-resolution spectroscopy obtained at ISS. Figure S1 shows a high energy-resolution fluorescence detected (HERFD) X-ray absorption spectrum (XAS) obtained on potassium hexachloroplatinate, $K\beta$ and valence-to-core X-ray emission spectra (XES) of several Ti containing compounds, and $K\beta$ ($1s3p$) resonant XES plane obtained from Co_3O_4 . The experimental details are summarized in the Figure caption. Typical spectrometer resolutions obtained in these tests were in the 0.5-1 eV range, as estimated from the full width at half maximum values of the elastic scattering peak.

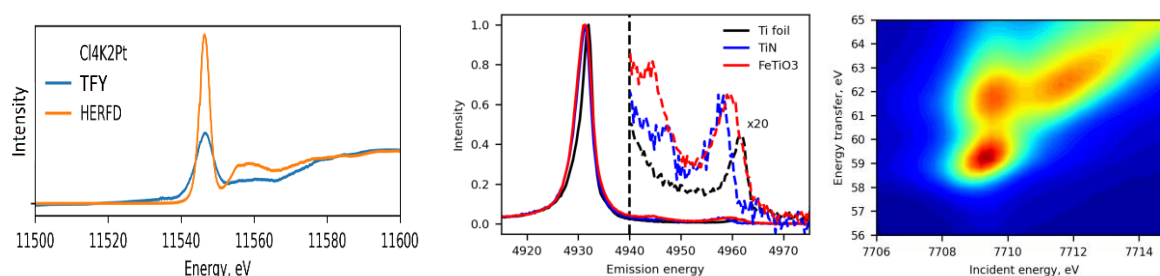


Figure S1 Figure S1. Results of initial high-resolution spectroscopy tests performed at ISS. (left) HERFD XAS data on potassium hexachloroplatinate (PtK_2Cl_6) measured in Johann geometry using a spherically curved Si(733) crystal with curvature radius of 1 m. The sample powder was deposited on Kapton tape. The spectrometer was set to the maximum of Pt $L\alpha$ emission. The energy scans were performed in step mode with 1 s exposure time for each point. (middle) $K\beta$ and valence-to-core XES data collected on neat Ti foil, Ti nitride TiN, and ilmenite $FeTiO_3$ in Von Hamos geometry using cylindrically curved Ge(100) crystal with 0.5 m curvature radius. TiN and ilmenite powders were deposited on Kapton tape. Spectra were collected with incident X-ray energy set to 5200 eV. Total exposure time for each spectrum was within 10-20 min range. (right) $K\beta$ ($1s3p$) resonant XES data collected on Co_3O_4 . The sample was prepared as a mixture of 5 mg of Co_3O_4 mixed with 95 mg of polyethylene glycol pressed into a pellet with 13 mm radius. The data was recorded in Johann geometry using a spherically curved Ge(111) crystal with 1 m curvature radius. The energy scans were performed in step mode with 1 s exposure time per point. In all measurements, Pilatus 100k was used as a detector.