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Implementation of the Cryo-EXAFS environment at the XANES end station of the KMC-2 beamline

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The KMC-2 [1] beamline at BESSY II [2], operates a graded SiGe monochromator (energy resolution $E/\Delta E = 4000$; energy range: 4 – 15 keV). The newly build Cryo-EXAFS environment at KMC-2 “XANES” end station has been developed for in situ gas absorption combined with X-ray powder diffraction experiments [3] and has been modified for use on the XANES end station. The Cryo-EXAFS is based on a Gifford-McMahon (GM) closed cycle cooler system. Exchange gas atmosphere of up to 150 kPa or vacuum can be utilized as sample environment. Continuous gas flow or controlled volumetric gas adsorption infrastructures are available. With an integrated heater stage the temperature range 15 - 450 K is accessible. Due to the double-dome construction for isolation vacuum and heat-exchange gas (Helium) temperature gradients in powder samples are very small. With multiple Kapton windows and a variable sample holder system, experiments can be conducted in both fluorescence and transmission geometry. The Cryo-EXAFS cryostat is mounted inside a three-axis translation motor stage for fine tuning of the sample position. Temperature readings and regulation, realized through a Lakeshore LS-336 controller is fully integrated into the instrument control software spec (CSS), allowing for fully automated temperature profile collection.

[1] Journal of large-scale research facilities 2, A49 (2016) doi: 10.17815/jlsrf-2-65

[2] helmholtz-berlin.de

[3] S. Krause et al., Nature, 532 (2016) 348

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