

Gas Cell For In Situ Soft X-ray Absorption Spectroscopy of Materials

A simple, portable gas cell design for soft X-ray absorption spectroscopy of materials during gas interaction is presented. The cell can be attached to the rear port of any suitable beamline, and is designed to be loaded and sealed within a glove box to enable the study of air- or moisture-sensitive materials. The cell operates in transmission-absorption mode and can handle gas pressures of at least 300 Torr, but less than 1 atm. Pressure can be cycled during operation, enabling studies of the same sample under vacuum and different pressures of gas. The cell has been successfully utilized to study CO₂ adsorption in metal-organic frameworks, including the Mg K-edge of Mg-MOF-74 and the N and O K-edges of diamene-appended analogs. Future applications could include studies of gas interactions with any thin film or porous sample. Future applications, as well as planned improvements to the design (temperature control, gas mixtures, etc.), are also discussed.

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