

## Current status and future developments of in situ XPS studies of solid-gas/vapor interfaces

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Interfaces have a fundamental role in chemistry because they are the place where most reactions take place. Over the last 20 years, in situ X-ray photoelectron spectroscopy (XPS) has known a huge technological development and now offers the possibility to routinely characterize solid-gas, solid-vapor and solid-liquid interfaces. In situ XPS has joined the surface sensitivity of the technique with the possibility to measure in the mbar range, thus partially filling the well-known pressure gap between surface science studies and many applications. As an example, it is possible to investigate the interaction of trace gases with inorganic salts, used as probes for atmospheric particles, with the opportunity to tune important parameters like the relative humidity. At the same time, several efforts have been spent to develop suitable methods to investigate buried interfaces. By creating thin liquid layers on solid substrates, it is possible to investigate ions dissolution and their local structure at the solid-liquid interface. I will focus on recent developments and state-of-the-art setups available worldwide. I will describe how such setups can be and have been used to address fundamental questions related to the field of environmental science. Finally, I will propose an outlook on the impact of future technical developments.

### Significance

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