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## New metal single crystal gas flow cell for in situ neutron diffraction experiments

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Diffraction studies during chemical reactions reveal details of reaction pathways, which are often crucial in the synthesis of functional materials.

Neutron diffraction is particularly valuable as a probe due to its sensitivity to light elements in the presence of heavy elements, especially in gas reactions involving elements such as hydrogen, nitrogen, oxygen, and carbon oxide. Therefore, it is necessary to develop sample environment tailored for in situ neutron diffraction experiments at high temperatures and gas flow, with low background noise and good neutron penetration.

A series of gas-pressure and gas-flow cells based on sapphire single crystals have been developed for real-time, in situ neutron diffraction studies of hydrogenation reactions. These cells can operate at temperatures up to 1110 K and pressures of up to 15 MPa, respectively [1,2]. The aim of presented project is to extend the capabilities of cells to 1500 K and 100 MPa, respectively. Results on a new metal single-crystal based gas-pressure and gas-flow cell for operando neutron diffraction with low background will be presented.

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### I apply for the best Poster Poster Award

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