Origins of Strong Metal-Support Interactions in Silica Supported Metal Catalysts

**Strong metal-support interaction (SMSI) is seen in metal oxide supported catalysts and affects their behaviour**

- Reducible oxide support (TiO₂, CeO₂, FeOₓ, Ta₂O₅, and Nb₂O₅)
- SMSI is rarely observed between hard-to-reduce oxide supports (SiO₂, MgO, ZnO) and metal nanoparticles

**Atomic-scale observations of SMSI in Co/SiO₂ catalyst**

- Crystallized SiO₂ overlayer
- Si layer
- Co nanoparticles
- SiO₂ film

**Microscopic and spectroscopic analyses**

- Migration of SiO₂ to Co surface to form quartz SiO₂ overlayer
- Partial reduction of SiO₂ to Si and formation of SiO₂-Si-Co interface
- Diffusion of Si in Co to form Co-Si alloy

**Reductive atmosphere**

- Pressure: 50 Pa
- Temperature: 750°C

**The confirmation of SMSI interactions in SiO₂ - supported metal catalysts will aid in future catalyst design**

Atomic origins of the strong metal–support interaction in silica supported catalysts
Yang and Li et al. (2021) | Chemical Science | DOI: 10.1039/d1sc03480d