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Exploring reactive interfaces: nanoplastics, catalysts, and 2D materials

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Propositions - Stellingen

accompanying the thesis

Exploring Reactive Interfaces: Nanoplastics, Catalysts, and 2D Materials

1. The ReactorAFM/STM provides a unique opportunity to close both the pressure gap and the materials gap in surface science. *(Chapter 3 of this thesis)*
2. Physical vapor deposition is a viable method for generating controlled laboratory samples of nanoplastics. *(Chapter 4 of this thesis)*
3. Operando microscopy is essential for understanding real catalytic processes and cannot be replaced by ex situ analysis. *(Chapters 3 and 5 of this thesis)*
4. The choice of molecular precursor critically determines the quality of h-BN growth on Ni(111). *(Chapter 5 of this thesis)*
5. The growing environmental crisis caused by plastics demands that nanoplastics research becomes as central to surface science as catalysis.
6. Without the use and integration of operando methods, surface science risks falling behind the pace of materials innovation.
7. The pressure and materials gaps will only be bridged when surface science embraces complexity rather than reducing it.
8. Advances in instrumentation have historically driven breakthroughs in physics and chemistry more than theoretical developments alone.
9. Instrumentation development should be valued in academia at the same level as scientific discovery, since one enables the other.
10. A research group should have a number of permanent support staff members somewhat proportional to the value of its experimental setups and potential group size.
11. Fault mirrors are made by natural and somewhat faulty polishing.

Tycho Roorda
Leiden, 21.10.2025