

# Janus transition metal dichalcogenides monolayers for efficient hydrogen evolution reaction

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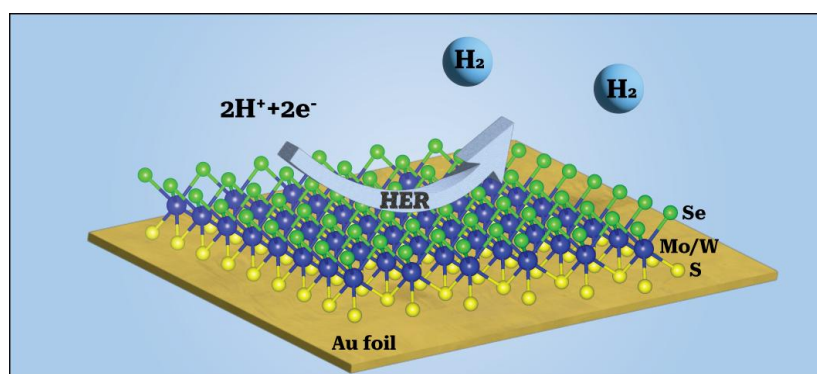
## Abstract

Janus transition metal dichalcogenide (TMD) monolayers of Mo and W with S and Se chalcogens, namely SeMoS and SeWS, were grown on gold (Au) foils using the chemical vapor deposition method.[1-2] The hydrogen evolution reaction (HER) catalytic activities of these Janus monolayers were studied and compared with those of their parent TMD counterparts. The Janus monolayers exhibited significantly enhanced catalytic performance relative to the parent TMDs. Furthermore, the Janus monolayers on Au substrates were subjected to sonochemical treatment, which led to a substantial improvement in HER activity. The resulting catalytic performance approached efficiencies comparable to platinum benchmarks. The underlying mechanism was further studied through density functional theory calculations. This enhancement in catalytic performance due to sonochemical treatment makes it fundamentally interesting for developing novel catalytic systems for HER based on 2D materials.

## References

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- [2] J. Picker, M. Ghorbani-Asl, M. Schaal, S. Kretschmer, F. Otto, M. Gruenewald, C. Neumann, T. Fritz, A. V. Krasheninnikov, A. Turchanin, *Nano Lett.* 25 (2025) 3330-3336.

## Figures



**Figure 1:** Schematic representation of the HER catalytic process of Janus TMDs on Au foils.