

## Ni loaded SnS<sub>2</sub> Hexagonal Nanosheets for Photocatalytic Hydrogen Generation Via Water Splitting

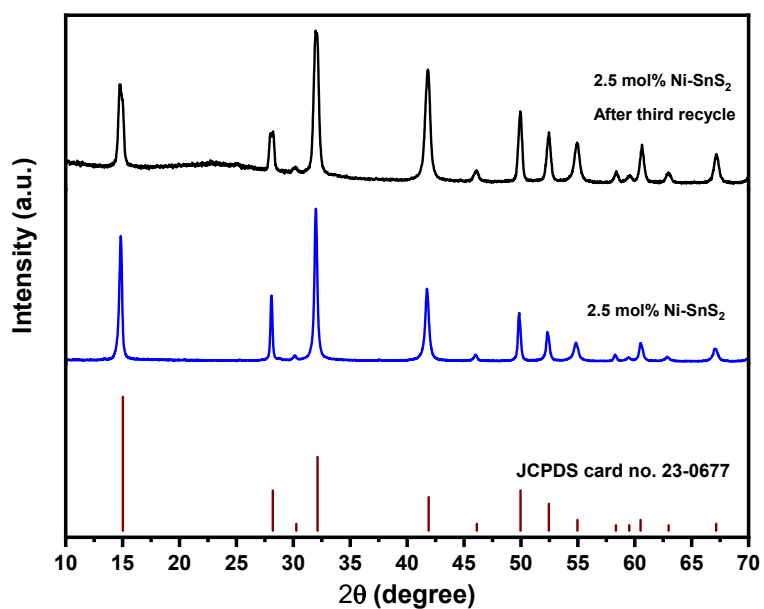
Niteen Jawale, Sudhir Arbuji,\* Govind Umarji, Manish Shinde, Bharat Kale, and Sunit Rane\*

*Materials for Renewable Energy and Sensor Division,  
Centre for Materials for Electronics Technology, Off Pashan Road, Panchavati, Pune 411008,  
Maharashtra, India.*

*E-mail: [sudhir1305@gmail.com](mailto:sudhir1305@gmail.com) / [sunit@cmet.gov.in](mailto:sunit@cmet.gov.in)*

*Tel: +912025899273; Fax: +912025898180*

---



**Figure S1.** XRD analysis of Ni-SnS<sub>2</sub> nanostructures as synthesized (2.5mol% Ni-SnS<sub>2</sub>) and after water splitting reaction (2.5mol% Ni-SnS<sub>2</sub> third recycle).

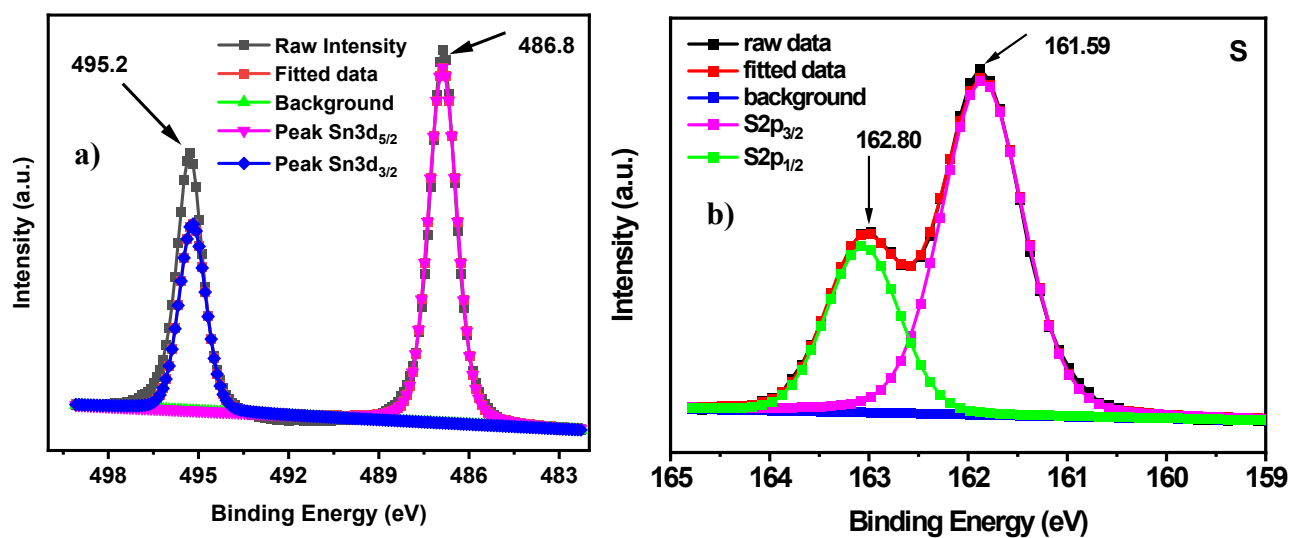
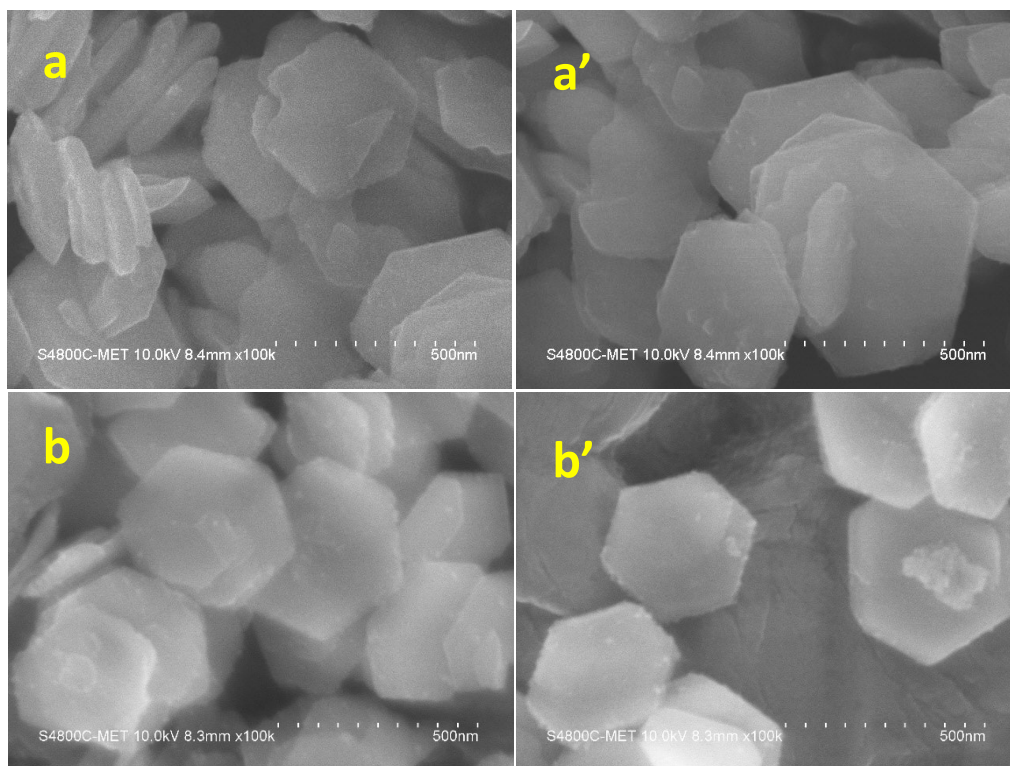
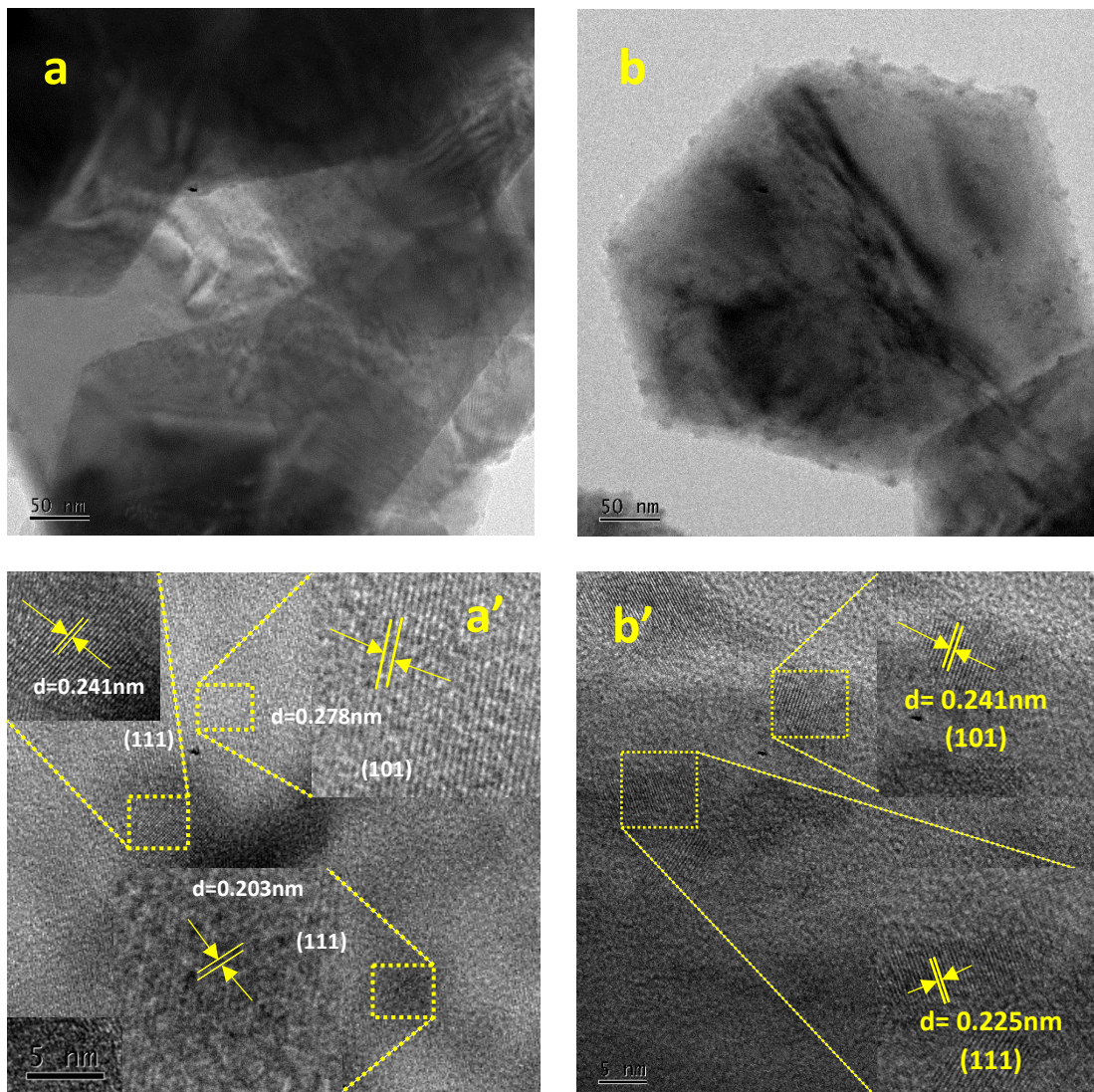


Figure S2. XPS analysis of pristine SnS<sub>2</sub> nanostructure a) for Sn and b) S.

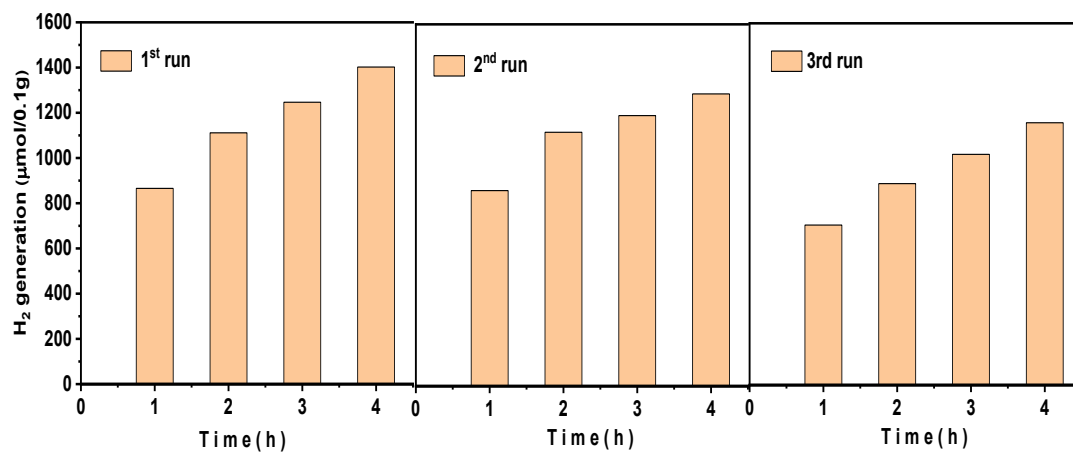


**Figure S3.** FE-SEM analysis of Ni-SnS<sub>2</sub> nanostructures, (a, a') as synthesized, and recycled (b, b') after water splitting reaction (third recycle).



**Figure S4.** FETEM analysis of Ni-SnS<sub>2</sub>, pristine 2.5mol% Ni-SnS<sub>2</sub> (a, a') and recycled 2.5mol% Ni-SnS<sub>2</sub> (b, b') images after water splitting reaction (third cycle).

(a)TEM image (a') HR-TEM image of as synthesized 2.5mol% Ni-SnS<sub>2</sub> respectively; (b) TEM image (b') HR-TEM image of 2.5 mol% Ni-SnS<sub>2</sub> nanosheet after water splitting reaction (third recycle) respectively. HR-TEM image (Fig. S4 a') exhibits the interplanar spacing of  $d=0.278\text{nm}$  corresponding to SnS<sub>2</sub> nanostructures with (101) plane,  $d=0.203\text{ nm}$  corresponding to Ni nanoparticle with (111) plane and  $d=0.241$  corresponding to NiO nanoparticles with (111) plane, respectively. Further, HR-TEM image (S4b') of Pt-Ni-SnS<sub>2</sub> nanostructures shows lattice fringes with a spacing  $d= 0.241\text{nm}$  and  $d=0.225\text{ nm}$  corresponding to the (101) and (111) plane of NiO and cubic platinum nanoparticles respectively. It clearly indicates that the Ni-SnS<sub>2</sub> catalyst remain same even after third recycle.



**Figure S5:** Recycling study of the 2.5mol% Ni-SnS<sub>2</sub> nanoplates for photocatalytic H<sub>2</sub>-generation performance.

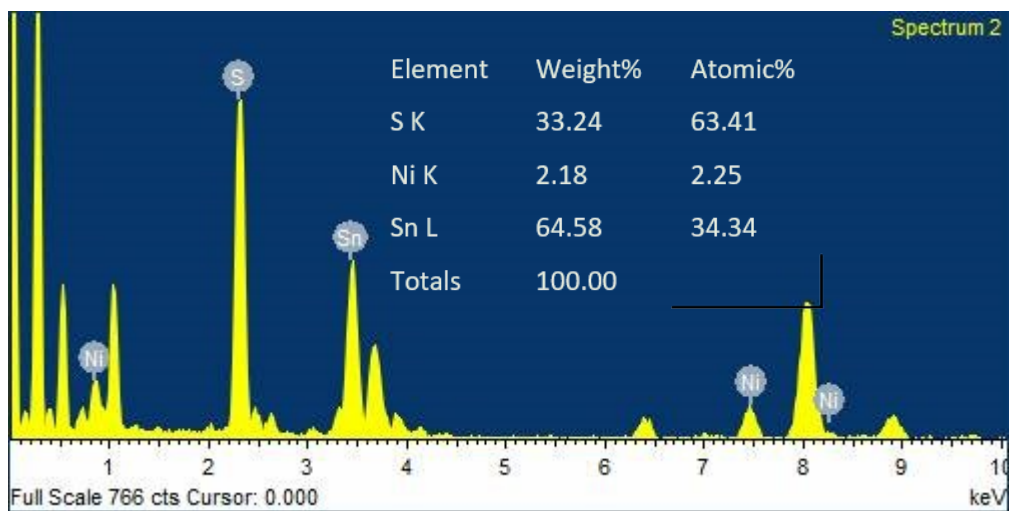


Fig S6: TEM-EDX spectra of 2.5 mol% Ni-SnS<sub>2</sub> nanostructure