

INDEPENDENT RESEARCH/PROJECT PROPOSAL

g – C₃N₄ modulated CaWO₄ for enhanced performance of photoelectrochemical (PEC) Water Splitting

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Introduction

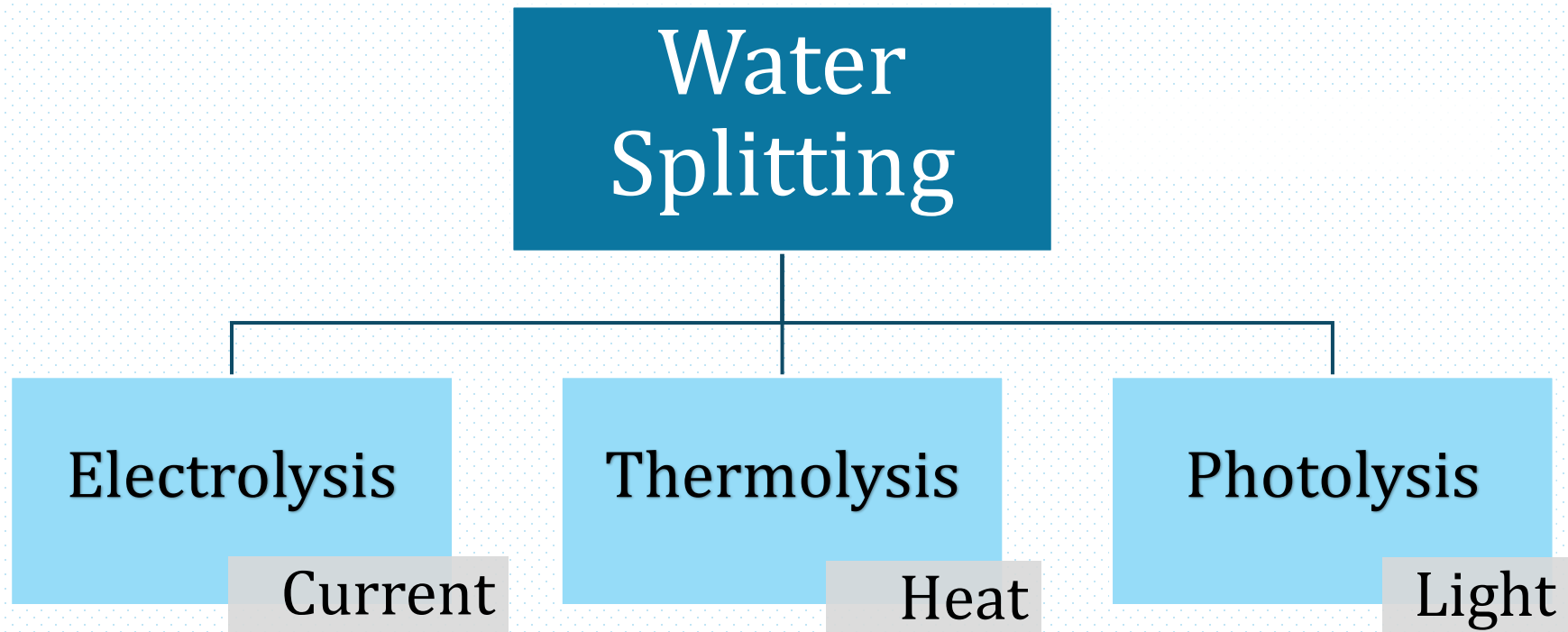
Water Splitting

Process of breaking down water molecules (H_2O) into their constituent elements: Hydrogen (H_2) and Oxygen (O_2)



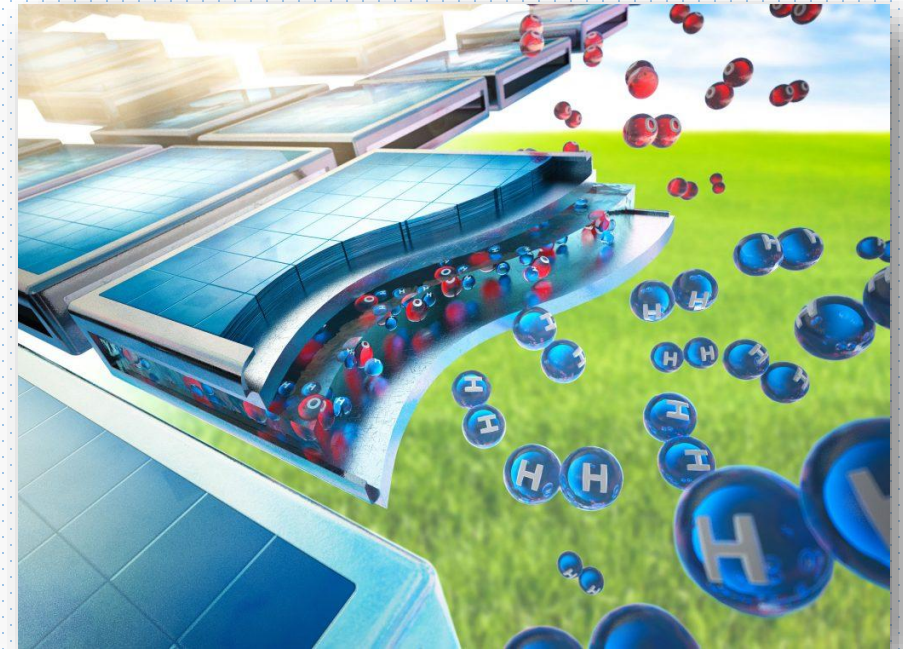
Introduction Cont..

Water Splitting Methods



Objective

Investigate the enhancement of photoelectrochemical water splitting for $\text{g-C}_3\text{N}_4$ modulated CaWO_4 .



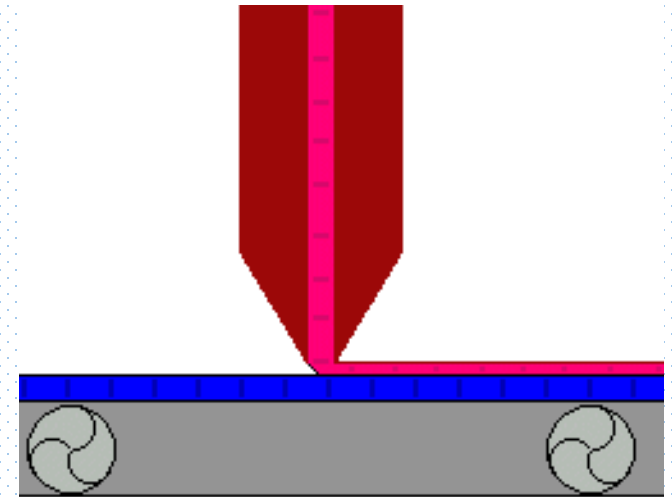
Methodology

■ Preparation of CaWO_4 Powder

- React aqueous solutions (0.1M each) of Calcium nitrate tetrahydrate $[\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}]$ and Sodium tungstate $[\text{Na}_2\text{WO}_4 \cdot 2\text{H}_2\text{O}]$ at room temperature with stirring.
- Centrifuge, Filter and Wash the precipitate several times with distilled water.
- Dry at 80 °C in an oven approximately 20 hours.
- Sinter the CaWO_4 precipitate in a furnace at a high temperature (350 °C) for 3 hours.

Methodology

- Coat the CaWO_4 Powder
 - Doctor Blade Method
- Characterization and performance evaluation
- Data analysis and comparison



Timeline

Activity	April		May				June			
	3	4	1	2	3	4	1	2	3	4
Literature Review										
Preparation of CaWO_4 Powder										
Coat the CaWO_4 Powder										
Data analysis and comparison										
Preparation for presentation										

References

- [01] N. A. Sabu, K.P. Priyanka, S. Ganesh, and T. Varghese, “Modifications in the structural and optical properties of nanocrystalline CaWO₄ induced by 8MeV electron beam irradiation,” *Radiation Physics and Chemistry*, vol. 123, pp. 1–5, Feb. 2016, doi: <https://doi.org/10.1016/j.radphyschem.2016.02.006>.
- [02] L. Yang, Y. Wang, Y. Wang, X. Wang, and G. Han, “Shape-controlled of CaWO₄ microcrystals by self-assembly of nanocrystals via a simple sonochemical method,” *Advanced Powder Technology*, vol. 24, no. 3, pp. 721–726, Apr. 2013, doi: <https://doi.org/10.1016/j.appt.2013.03.012>.
- [03] D. Tang, W. Xiao, H. Yin, L. Tian, and D. Wang, “Production of Fine Tungsten Powder by Electrolytic Reduction of Solid CaWO₄ in Molten Salt,” *Journal of the Electrochemical Society*, vol. 159, no. 6, pp. E139–E143, Jan. 2012, doi: <https://doi.org/10.1149/2.113206jes>.
- [04] J. E. Yourey and B. M. Bartlett, “Electrochemical deposition and photoelectrochemistry of CuWO₄, a promising photoanode for water oxidation,” *Journal of Materials Chemistry*, vol. 21, no. 21, p. 7651, 2011, doi: <https://doi.org/10.1039/c1jm11259g>.



Thank You!