

Supplementary Information

Photocatalytic Hydrogen Evolution via Artificial Seawater Splitting over Amorphous Carbon Nitride: Optimization and Process Parameters Study via Response Surface Modelling

Michell K. T. Chee^a, Boon-Junn Ng^a, Yi-Hao Chew^a, Wei Sea Chang^b, Siang-Piao Chai^{a,*}

^aMultidisciplinary Platform of Advanced Engineering, Chemical Engineering Discipline, School of Engineering, Monash University, Jalan Lagoon Selatan, Bandar Sunway, 47500 Selangor, Malaysia.

^bMechanical Engineering Discipline, School of Engineering, Monash University, Jalan Lagoon Selatan, Bandar Sunway, 47500 Selangor, Malaysia.

*Correspondence to: chai.siang.piao@monash.edu

S1 Composition of sea salt

Table S1. Composition of sea salt.

Ion	Conc.	Ion	Conc.
Chloride	19230 mg/L	Silicon	< 0.05 mg/L
Sodium	10610 mg/L	Iron	0.012 mg/L
Sulfate	2485 mg/L	Copper	0.0003 mg/L
Magnesium	1390 mg/L	Nickel	< 0.015 mg/L
Potassium	398 mg/L	Zinc	0.008 mg/L
Calcium	409 mg/L	Manganese	0.01 mg/L
Carbonate/Bicarbonate	179 mg/L	Molybdenum	0.01 mg/L
Strontium	10 mg/L	Cobalt	0.0004 mg/L
Boron	7.6 mg/L	Vanadium	< 0.015 mg/L
Bromide	20 mg/L	Selenium	< 0.019 mg/L
Iodide	0.05 mg/L	Rubidium	0.115 mg/L
Lithium	0.26 mg/L	Barium	< 0.05 mg/L

S2 Photoluminescence spectra of GCN and ACN

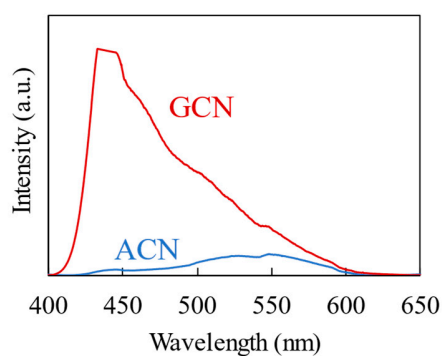


Figure S1. The photoluminescence spectra of GCN and ACN.

S3 Field Emission Scanning Electron Microscopy of GCN

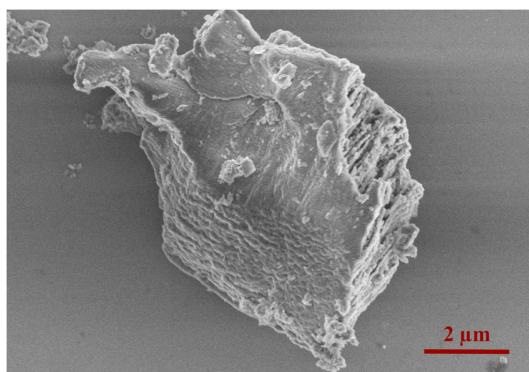


Figure S2. Field Emission Scanning Electron Microscopy of GCN.

S4 Photocatalytic performance of GCN and ACN

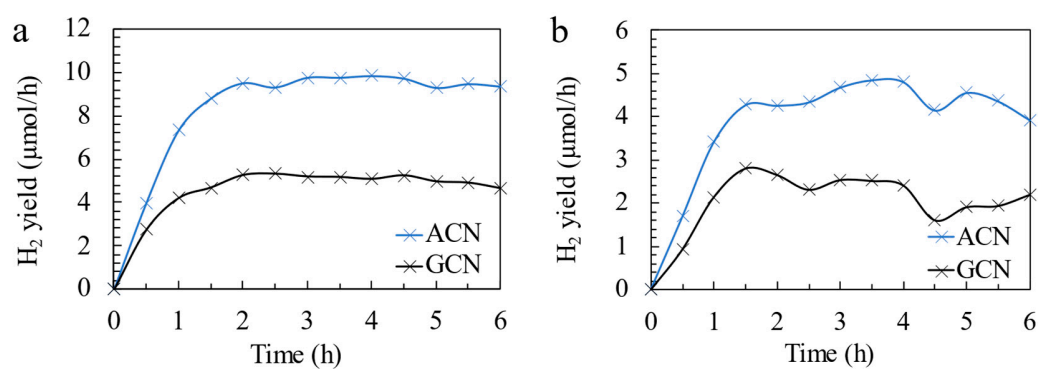


Figure S3. The photocatalytic H₂ production rate over 6 hours duration by GCN and ACN in (a) simulated seawater under optimum conditions calculated from RSM (2.55 g/L catalyst loading, 17.46 vol% TEOA and 45.06 g/L salinity); (b) pure water (0.75 g/L catalyst loading, 10 vol% TEOA and 0 g/L salinity).

S5 Plots of optimum conditions at different factorial level

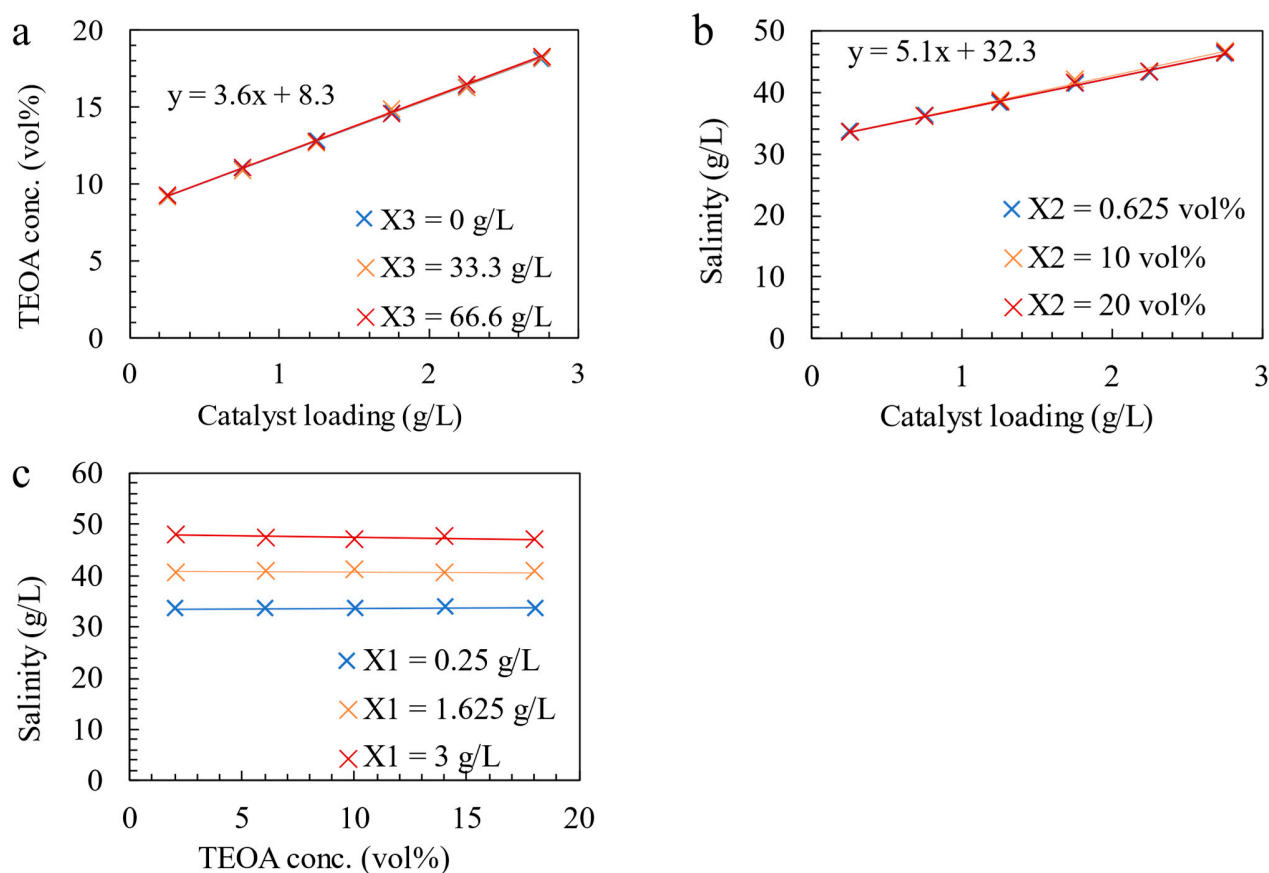


Figure S4. Plots of (a) optimum TEOA concentration against catalyst loading at 3 levels of sea salt content (-1, 0, +1); (b) optimum sea salt content against catalyst loading at 3 levels of TEOA concentration (+1, 0, -1); (c) optimum sea salt content against TEOA concentration at 3 levels of catalyst loading (+1, 0, -1).

S6 Stability test of ACN in artificial seawater under optimum conditions

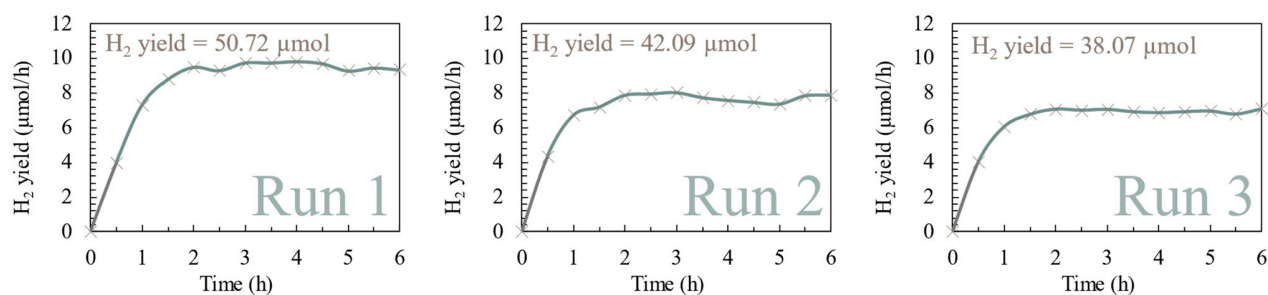


Figure S5. H₂ yield rate in 6 hours for 3 consecutive runs (Run 1–3) under optimum conditions (2.55 g/L catalyst loading, 17.46 vol% TEOA and 45.06 g/L salinity).