Journal of Materials Chemistry A

Supporting Information

Diaminotetrazine Based Mesoporous C_3N_6 with Well-Ordered 3D Cubic Structure and its Excellent Photocatalytic Performance on Hydrogen Evolution

Siddulu Naidu Talapaneni,[a]* Gurudas P. Mane,[a, c] Dae-Hwan Park,[a] Kripal S. Lakhi,[a] Kavitha Ramadass,[a] Stalin Joseph,[a] William M. Skinner,[a] Ugo Ravon,[b] Khalid Al-Bahily,[b] and Ajayan Vinu[a]*

[a]*Future Industries Institute (FII), Division of Information Technology, Engineering and Environment (DivITEE), Mawson Lakes Campus, University of South Australia, Adelaide, SA 5095, Australi.*
[b]*SABIC Corporate Research and Development Center at KAUST, Saudi Basic Industries Corporation, Thuwal 23955, Saudi Arabia.*
[c]*Bhabha Atomic Research Centre, Trombay, 400085, Mumbai, India.*

**To whom the correspondence should be addressed*
Email: Siddulu.Talapaneni@unisa.edu.au; Ajayan.Vinu@unisa.edu.au
Ph: +61-8-830-25384, Fax: +61-8-830-25639

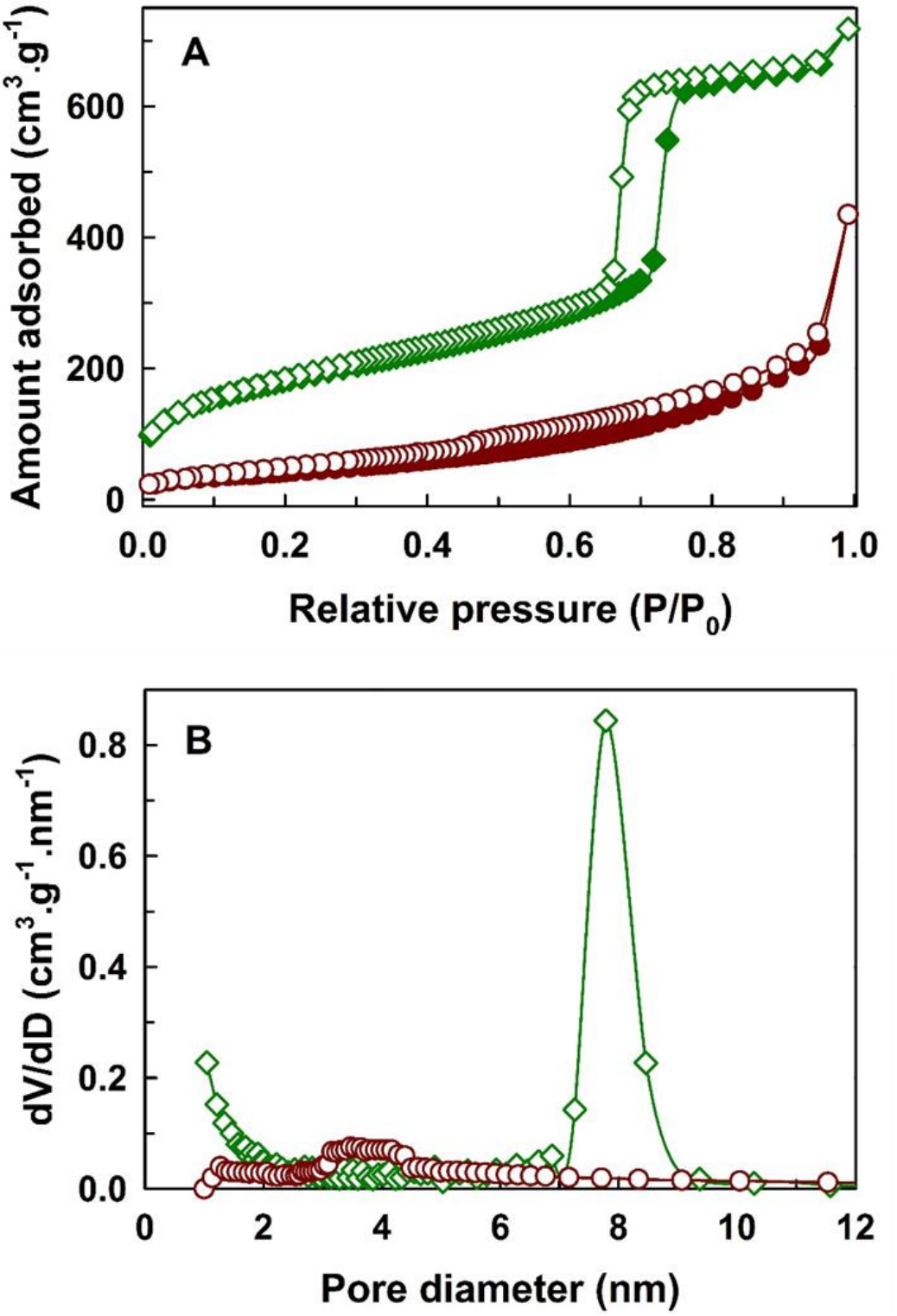

Figure S1. (A) Nitrogen adsorption–desorption isotherms and (B) BJH pore-size distributions of c-MCN-100 (circles) and KIT-6-100 (diamonds) silica template.

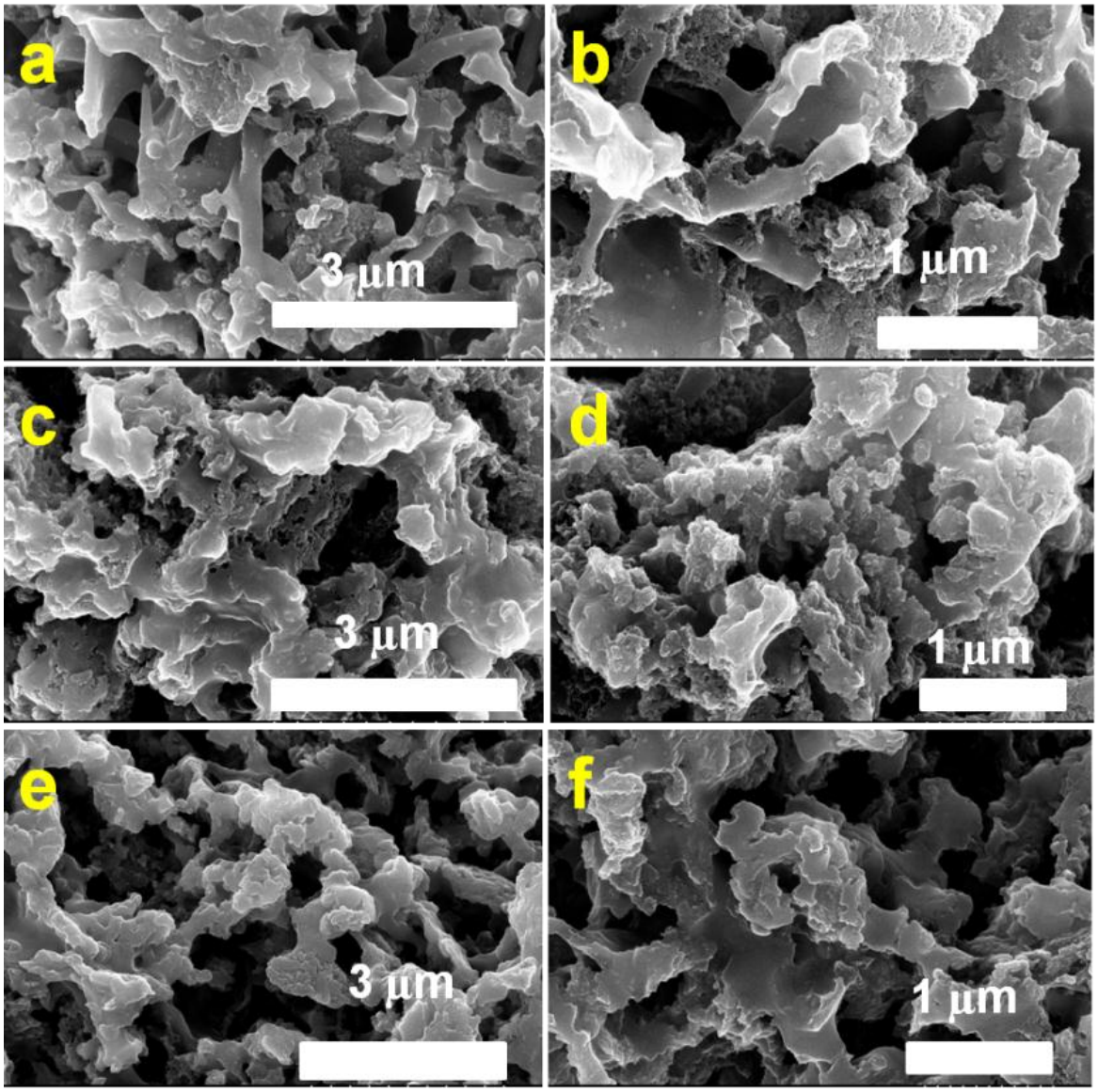

Figure S2. HRSEM images of (a-b) c-MCN-100, (c-d) c-MCN-130 and (e-f) c-MCN-150 samples at different magnifications.

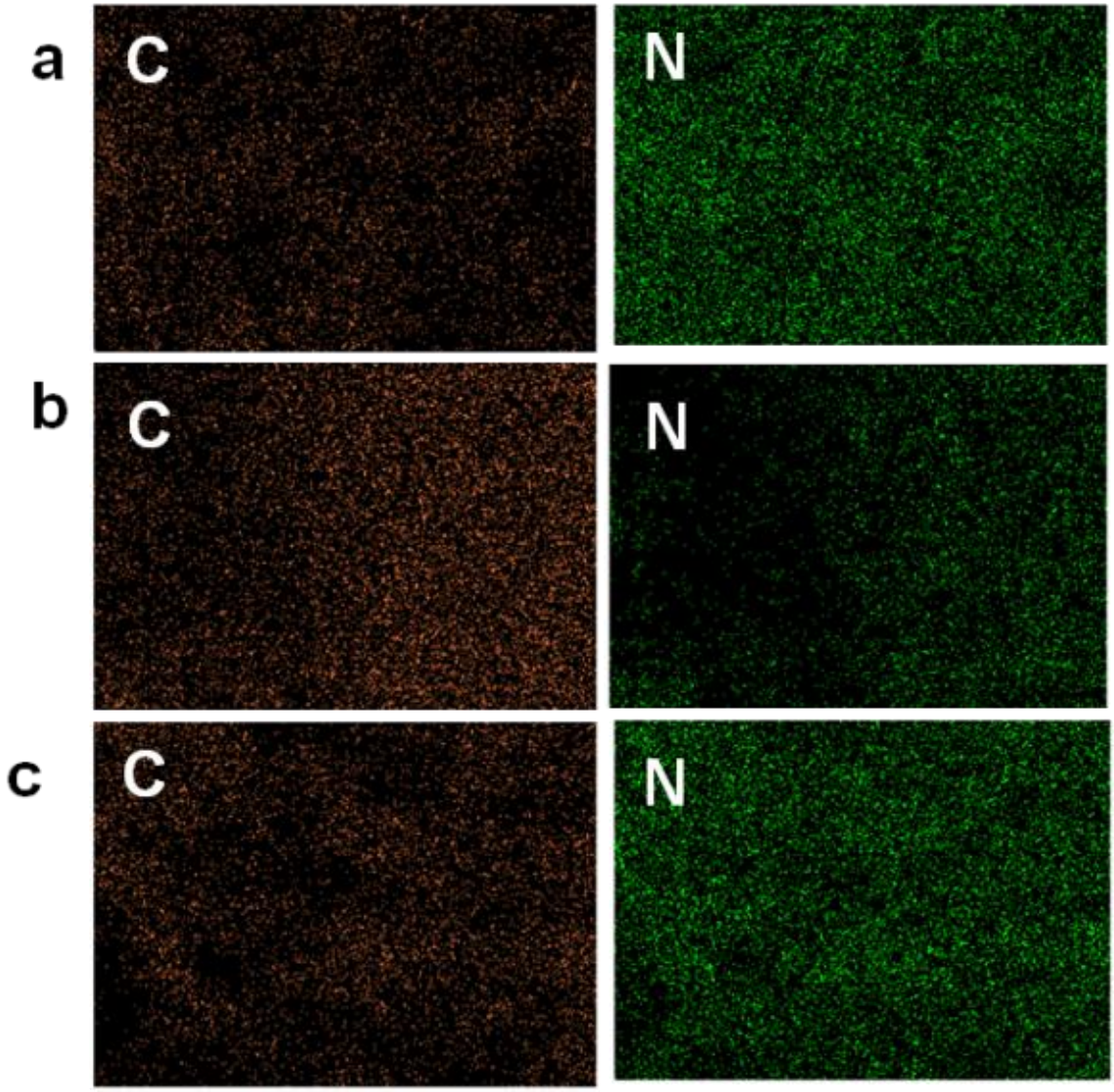

Figure S3. Elemental mappings of (a) c-MCN-100, (b) c-MCN-130 and (c) c-MCN-150.

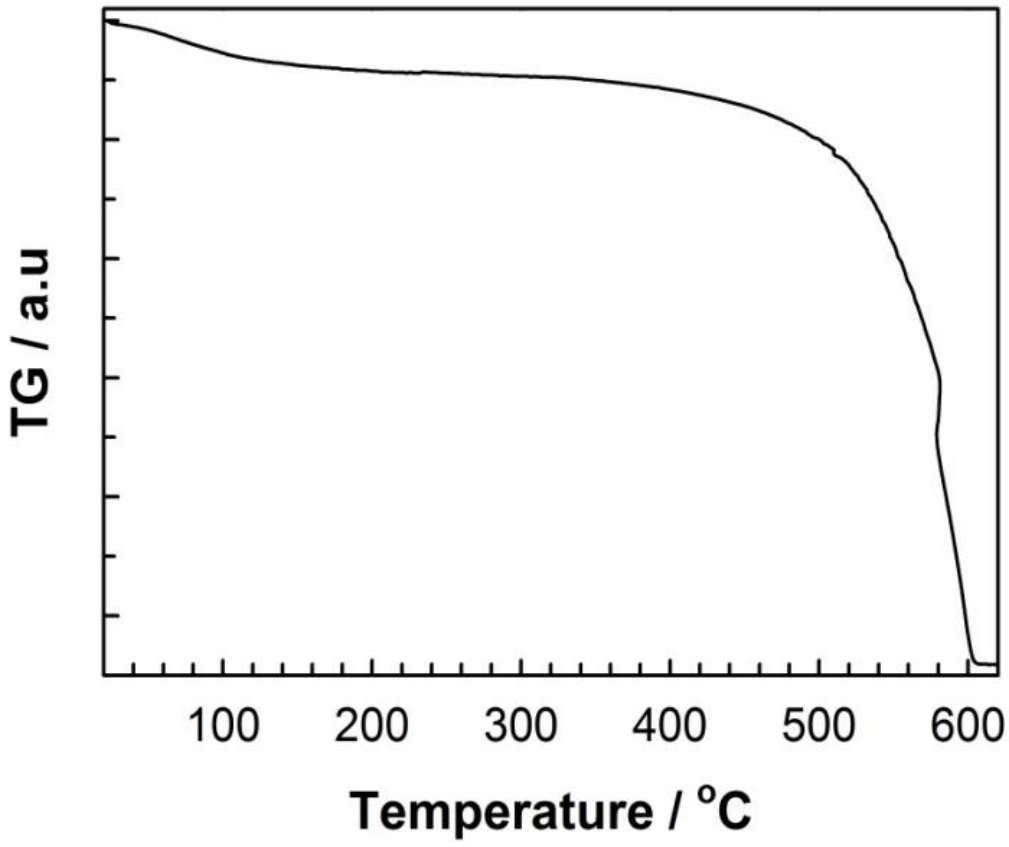

Figure S4. TG curve of c-MCN-150 under nitrogen atmosphere.

Table S1 Textural parameters of KIT-6 silica templates having different pore diameters synthesized at 100, 130 and 150°C temperatures

Material	$d_{(211)}$ Spacing (nm)	Unit cell a_0 (nm)	A_{BET} ($m^2.g^{-1}$)	V_p ($cm^3.g^{-1}$)	$d_{p,\ BJH}$ (nm)
KIT-6-100	9.17	22.5	728	0.99	8.0
KIT-6-130	9.62	23.6	625	1.32	9.9
KIT-6-150	9.81	24.0	555	1.53	11.3

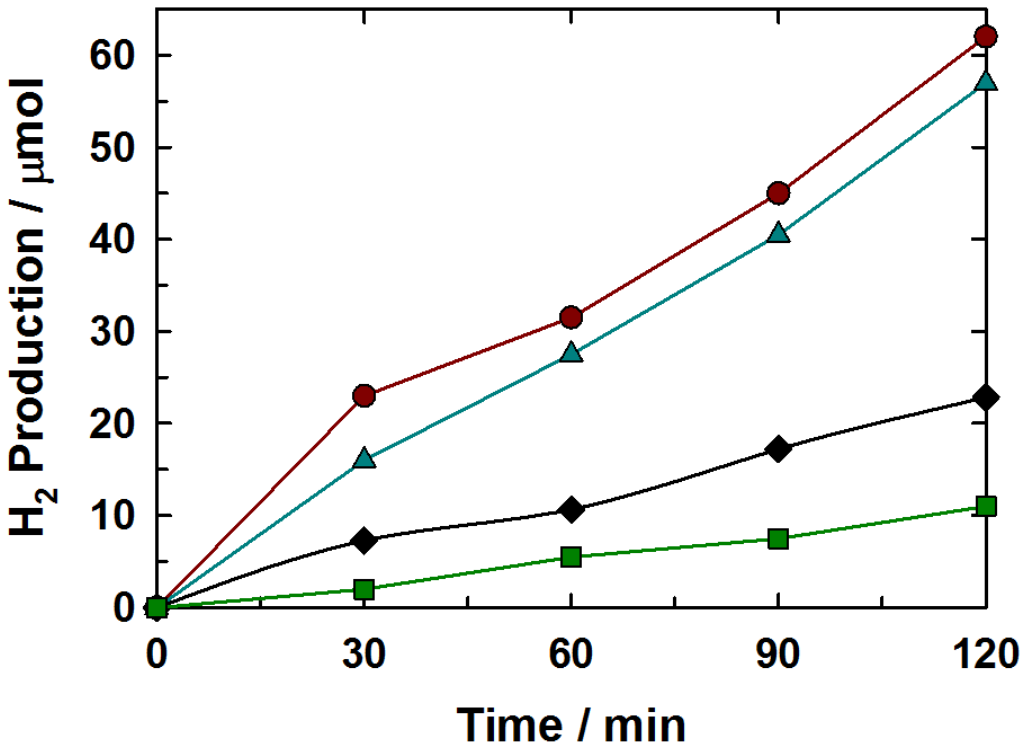

Figure S5. Time course of H_2 gas evolution using MCN-9 photocatalyst (circles) as a function of time, with reference to mesoporous C_3N_6 with 2D structure (up triangles), 3D mesoporous C_3N_4 and bulk non-porous C_3N_4.

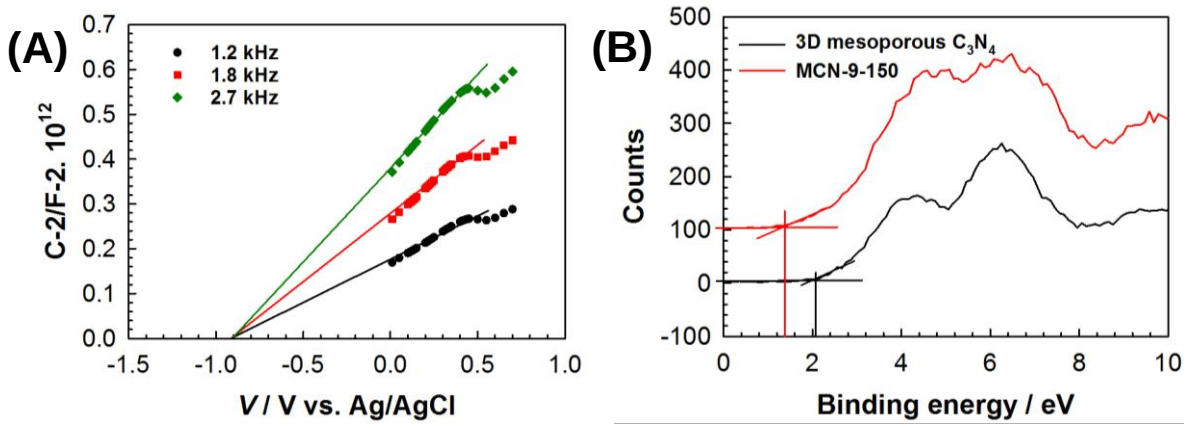

Figure S6. (A) Electrochemical Mott-Schottky plots of of MCN-9-150 at different frequencies (B) XPS valance band spectra of 3D mesoporous C_3N_4 and MCN-9-150.

Table S2 The apparent quantum efficiency (AQE) for photocatalytic hydrogen evolution over MCN-9, mesoporous C_3N_6 with 2D structure, bulk non-porous C_3N_6, 3D mesoporous C_3N_4 and bulk non-porous C_3N_4 photocatalysts, using diode laser as the incident light (405 nm)

Sample name	AQE (%)
MCN-9-150	0.212
mesoporous C_3N_6 with 2D structure	0.185
bulk non-porous C_3N_6	0.037
3D mesoporous C_3N_4	0.071
bulk non-porous C_3N_4	0.037