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Title:	Metal-Free Triazine-Based 2D Covalent Organic Framework for Efficient H ₂ Evolution by Electrochemical Water Splitting
Authors:	Prasenjit, Das (/jspui/browse?type=author&value=Prasenjit%2C+Das) Mandal, Sanjay K. (/jspui/browse?type=author&value=Mandal%2C+Sanjay+K.)
Keywords:	Triazine-Based Electrochemical
Issue Date:	2021
Publisher:	Wiley
Citation:	ChemSusChem, 14(22), 5057–5064.
Abstract:	Hydrogen evolution reaction (HER) by electrochemical water splitting is one of the most active areas of energy research, yet the benchmark electrocatalysts used for this reaction are based on expensive noble metals. This is a major bottleneck for their large-scale operation. Thus, development of efficient metal-free electrocatalysts is of paramount importance for sustainable and economical production of the renewable fuel hydrogen by water splitting. Covalent organic frameworks (COFs) show much promise for this application by virtue of their architectural stability, nanoporosity, abundant active sites located periodically throughout the framework, and high electronic conductivity due to extended π -delocalization. This study concerns a new COF material, C6-TRZ-TFP, which is synthesized by solvothermal polycondensation of 2-hydroxybenzene-1,3,5-tricarbaldehyde (TFP) and 4,4',4''-(1,3,5-triazine-2,4,6-triyl)tris[(1,1'-biphenyl)-4-amine]. C6-TRZ-TFP displayed excellent HER activity in electrochemical water splitting, with a very low overpotential of 200 mV and specific activity of 0.2831 mA cm ⁻² together with high retention of catalytic activity after a long duration of electrocatalysis in 0.5 M aqueous H ₂ SO ₄ . Density functional theory calculations suggest that the electron-deficient carbon sites near the π electron-donating nitrogen atoms are more active towards HER than those near the electron-withdrawing nitrogen and oxygen atoms.
Description:	Only IISER Mohali authors are available in the record.
URI:	https://chemistry-europe.onlinelibrary.wiley.com/doi/10.1002/cssc.202101663 (https://chemistry-europe.onlinelibrary.wiley.com/doi/10.1002/cssc.202101663) http://hdl.handle.net/123456789/5145 (http://hdl.handle.net/123456789/5145)
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