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| <b>Title (4)</b>              | : | <b>Well-Designed 2D/2D/2D Ternary ZCO/CN/TiC Nanocomposite for Efficient Photocatalytic H<sub>2</sub> Production Through Water Splitting Under Visible Light</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Journal</b>                | : | Chemistry Select                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Document Type</b>          | : | Article                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Publisher</b>              | : | Wiley                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| <b>Link to Full Text</b>      | : | <a href="https://chemistry-europe.onlinelibrary.wiley.com/doi/abs/10.1002/slct.202403308">https://chemistry-europe.onlinelibrary.wiley.com/doi/abs/10.1002/slct.202403308</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Link to UniKL IR</b>       | : |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <b>Abstract</b>               | : | <p>Photocatalytic water splitting is considered as one of the most promising technologies for hydrogen production. A novel 2D/2D/2D ZnCo<sub>2</sub>O<sub>4</sub>/g-C<sub>3</sub>N<sub>4</sub>/Ti<sub>3</sub>C<sub>2</sub> (ZCO/CN/TiC) nanocomposite was synthesized through a facile thermal method for efficient photocatalytic H<sub>2</sub> production under visible light. This multi-heterojunction system displayed an efficient performance with higher H<sub>2</sub> production rates compared to single catalysts. The experimental results revealed a hydrogen production rate of 1465 μmol g<sup>-1</sup> for the ZCO/CN/TiC ternary composite after 4 h of light irradiation, which is about 3.8 and 2.5 times higher than that of g-C<sub>3</sub>N<sub>4</sub> and g-C<sub>3</sub>N<sub>4</sub>/Ti<sub>3</sub>C<sub>2</sub>, respectively. This significant enhancement is mainly attributed to the efficient charge transfer within the constructed heterojunction system and due to the presence of MXene (Ti<sub>3</sub>C<sub>2</sub>), which acted as a solid electron mediator to suppress the charge recombination rate. Both the type and the amount of used sacrificial agent have exhibited a significant effect on the H<sub>2</sub> production rate. The ZCO/CN/TiC ternary nanocomposite has also displayed the best quantum yield (QY = 1.316). The newly developed structured photocatalyst would provide a promising approach for the construction of easy-prepared and noble-metal-free photocatalysts for the application of clean and sustainable fuel production.</p> |