Supporting Materials

Powering the Future: Leveraging Carbon Nanotubes, Silicon Nanowires, and MoS2 for Breakthroughs in Hydrogen Production and Li-ion Batteries

Abniel Machín1, María C. Cotto2, Francisco Márquez\*2, Jesús Díaz3, Celia Polop3,4, Carmen Morant\*5

1 Division of Natural Sciences and Technology, Universidad Ana G. Méndez-Cupey Campus, San Juan, 00926 San Juan, PR, United States

2 Nanomaterials Research Group, School of Natural Sciences and Technology, Universidad Ana G. Méndez-Gurabo Campus, 00778 Gurabo, PR, United States

3 Department of Condensed Matter Physics, Autonomous University of Madrid, and Instituto de Ciencia de Materiales Nicolás Cabrera, Madrid, 28049, Spain

4 IFIMAC: Condensed Matter Physics Center (IFIMAC), Universidad Autónoma de Madrid, Madrid, 28049, Spain

5 Department of Applied Physics, Autonomous University of Madrid, and Instituto de Ciencia de Materiales Nicolás Cabrera, Madrid, 28049, Spain

**\*** Correspondence: fmarquez@uagm.edu (F.M.); c.morant@uam.es (C.M.); +1-787-743-7979, ext. 4250 (F.M.); +34-914974924 (C.M.)

**Table S1.** BET surface area of the different composites.

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| --- | --- |
| **Catalyst** | **BET surface area (m2g-1)** |
| ZnONPs | 62 |
| ZnONPs-SiNWs-CNTs | 297 |
| 5%(MoS₂-SiNWs)@ZnONPs-CNTs | 231 |
| 6.7%(MoS₂-SiNWs)@ZnONPs-CNTs | 246 |

**Table S2.** Elemental composition of MoS₂@SiNWs@CNT and MoS₂@CNT electrodes after 100 charge/discharge cycles, measured by Nuclear Reaction Analysis (NRA).

Tabla

Descripción generada automáticamente

Gráfico, Gráfico de líneas

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**Figure S1.** Effect of pH on the photocatalytic activity of the 6.7%(MoS2-SiNWs)@ZnONPs-CNTs catalyst for hydrogen production.

Gráfico, Gráfico de líneas

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**Figure S2.** Evaluation of the initial concentration of the 6.7%(MoS2-SiNWs)@ZnONPs-CNTs catalyst on the efficiency of hydrogen production.

Gráfico, Gráfico de barras

Descripción generada automáticamente

**Figure S3.** Control experiments for 6.7%(MoS2-SiNWs)@ZnONPs-CNTs on the efficiency of hydrogen production.

Gráfico, Gráfico de líneas

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**Figure S4.** Hydrogen production via water splitting using 6.7%(MoS2-SiNWs)@ZnONPs-CNTs under irradiation, and also in the presence of a hole scavenger, namely EDTA-Na2.

Obraz zawierający tekst, zrzut ekranu, linia, Równolegle

Opis wygenerowany automatycznie

**Figure S5.** Recyclability of 6.7%(MoS2-SiNWs)@ZnONPs-CNTs after 10 consecutive catalytic cycles of hydrogen production, under irradiation at 500 nm.

Gráfico, Histograma

Descripción generada automáticamente

**Figure S6.** Photoluminescence of ZnONPs (a); ZnONPs-CNTs (b); 5%(MoS2-SiNWs)@ZnONPs-CNTs (c); and 6.7%(MoS2-SiNWs)@ZnONPs-CNTs (d), by a 350 nm excitation at room temperature.

Gráfico, Histograma

Descripción generada automáticamente

**Figure S7.** Differential capacity (dQ/dV) curves for (a) MoS₂@CNT at 0.1 A/g, (b) MoS₂@SiNW@CNT at 0.1 A/g, and (c) MoS₂@SiNW@CNT at 1 A/g.

Imagen que contiene exterior, foto, agua, diferente

Descripción generada automáticamente

**Figure S8.** Cross-sectional SEM images of pristine and cycled electrodes: (a) MoS₂@CNT (80:20 wt.%) before cycling, (b) MoS₂@CNT after 100 cycles at 1 A/g, (c) MoS₂@SiNW@CNT (56:24:20 wt.%) before cycling, and (d) MoS₂@SiNW@CNT after 100 cycles at 1 A/g. .