Supplementary Material

Controllable Synthesis of 2D Non-layered Cr2S3 Nanosheets and their Electrocatalytic Activity Toward Oxygen Evolution Reaction

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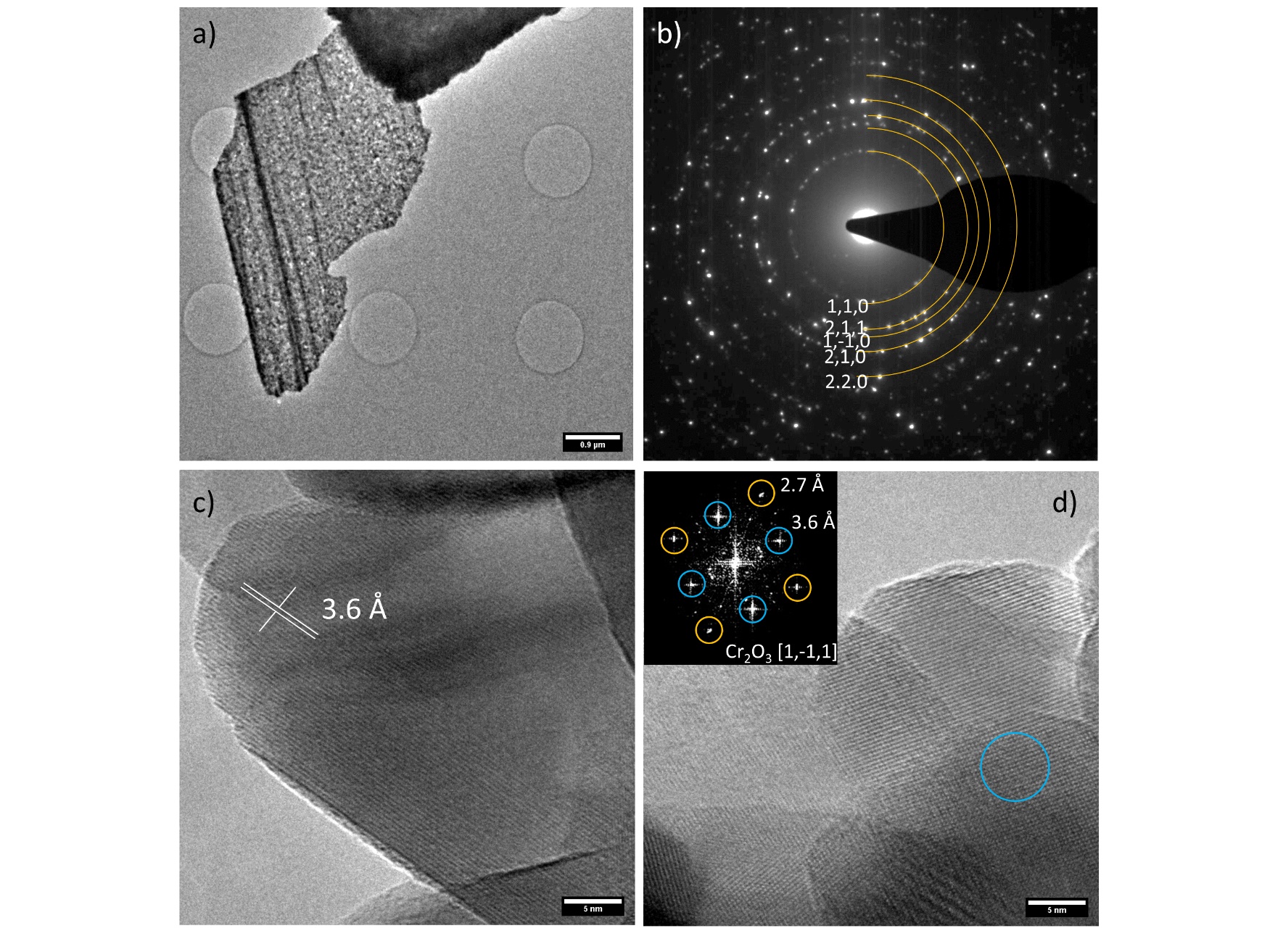
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**FIGURE S1:**  a) low magnification HR-TEM micrograph and SAED image of the same structure, displaying a polycrystalline pattern assigned to hexagonal Cr2O3 precursor. c) and d) high magnification micrographs displaying the nanoscale structure and the presence of multiple Cr2O3 crystal domains.

A screenshot of a computer

Description automatically generated with medium confidence

**FIGURE S2:** XRD pattern of Cr2O3/CF precursor.

Graphical user interface

Description automatically generated

**FIGURE S3:** HRTEM image (a) and the corresponding SAED pattern (b) of Cr2S3



**FIGURE S4:** The OER performance normalized byelectrochemical activated surface area (ECSA). ECSA was determined by the equation of ECSA = Cdl/Cs×S, where Cs is the capacitance of an atomically smooth planar surface (0.04 mF cm-2 in alkaline media) (McCrory et al., 2013), and S is the electrode area.

Graphical user interface, chart

Description automatically generated

**FIGURE S5:** EIS fitting for Cr2S3 (a) and Cr2O3(b)

**Table S1. The comparison of the OER performances in 1M KOH**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S/No** | **Catalyst** | **Overpotential (current density)** | **Tafel slope ( mV/dec)** | **stability** | **Reference** |
|  | FeP/Ni2P | 154 mV (10 mA/cm2) | 22.7 | 24hr | (Yu et al., 2018) |
|  | Fe(PO3)2/Ni2P | 177 mV (10 mA/cm2) | 51.9 | 20hr | (Zhou et al., 2017) |
|  | Fe-doped Ni2P | 255 mV (500 mA/cm2) | 29.1 | 16hr | (Cai et al., 2018) |
|  | Fe-Co-P hollow sphere | 252 mV (10 mA/cm2) | 33 | 24hr | (Liu et al., 2017) |
|  | Ni0.6Co1.4P | 300 mV (10 mA/cm2) | 80 | 10hr | (Qiu et al., 2018) |
|  | NixFe1-xSe2 | 195 mV (10 mA/cm2) | 28 | 24hr | (Xu et al., 2016) |
|  | Al doped Ni5P4 | 180 mV (10 mA/cm2) | 27 | 200hr | (Xu et al., 2018) |
|  | CoMnP | 330 mV (10 mA/cm2) | 61 | 15 hr | (Li et al., 2016a) |
|  | Co doped Nickel phosphide | 360 mV (10 mA/cm2) | 65.7 | 24h | (Li et al., 2016b) |
|  | Fe doped CoP nano array | 310 mV (100 mA/cm2) | 67 | 40hr | (Tang et al., 2017) |
|  | NiCoP/C | 330mV (10 mA/cm2) | 96 | 10 hr | (He et al., 2017) |
|  | NiMoP2 | 330mV (100 mA/cm2) | 90.6 | 24 hr | (Wang et al., 2017) |
|  | Al doped CoP nanoarray | 330mV (10 mA/cm2) | 43 | 40hr | (Zhang et al., 2017) |
|  | Sn doped Ni5P4 | 170mV (10 mA/cm2)  190 (30 mA/cm2) and | 36 | 36 hr | (Ahmed Shifa et al., 2021) |
|  | (NiCo-9AC-AD)\* | 350mV (100 mA/cm2)  143mV (10 mA/cm2) | 51.3 | 30hr | (Ye et al., 2019) |
|  | NiFe-LDHs | 370 mV (30 mA/cm2) | 33.4 | 8hr | (Gao and Yan, 2018) |
|  | CrMnFeCoNi)Sx | 295 mV (100 mA/cm2) | 66 | 10hr | (Cui et al., 2021) |
|  | **Cr2S3** | **230mV (10mA/cm2)** | **120** | **10hr** | **This work** |

\* Co/Ni-based mixed metal−organic nanosheet array

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