

Supplementary Materials

Enhancement of the Green H₂ Production by Using TiO₂ Composite Polybenzimidazole Membranes

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Citation: Díaz-Abad, S.; Rodrigo, M.A.; Sáez, C.; Lobato, J. Enhancement of the Green H₂ Production by Using TiO₂ Composite Polybenzimidazole Membranes. *Nanomaterials* **2022**, *12*, 2920. <https://doi.org/10.3390/nano12172920>

Academic Editor: Filipe M.L. Figueiredo

Received: 7 July 2022

Accepted: 22 August 2022

Published: 24 August 2022

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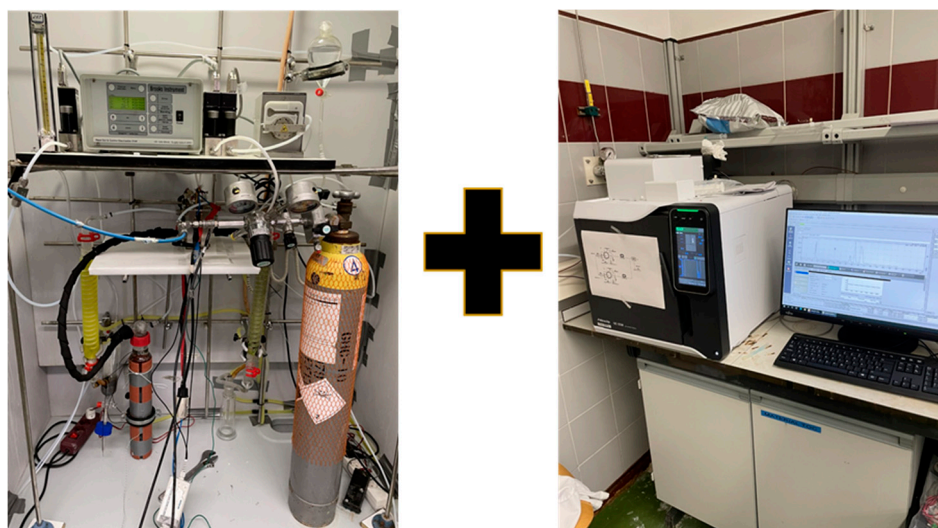


Figure S1. Experimental set-up.

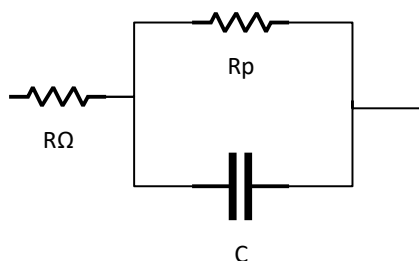


Figure S2. (RC) circuit use to fit the EIS data with the software NOVA.

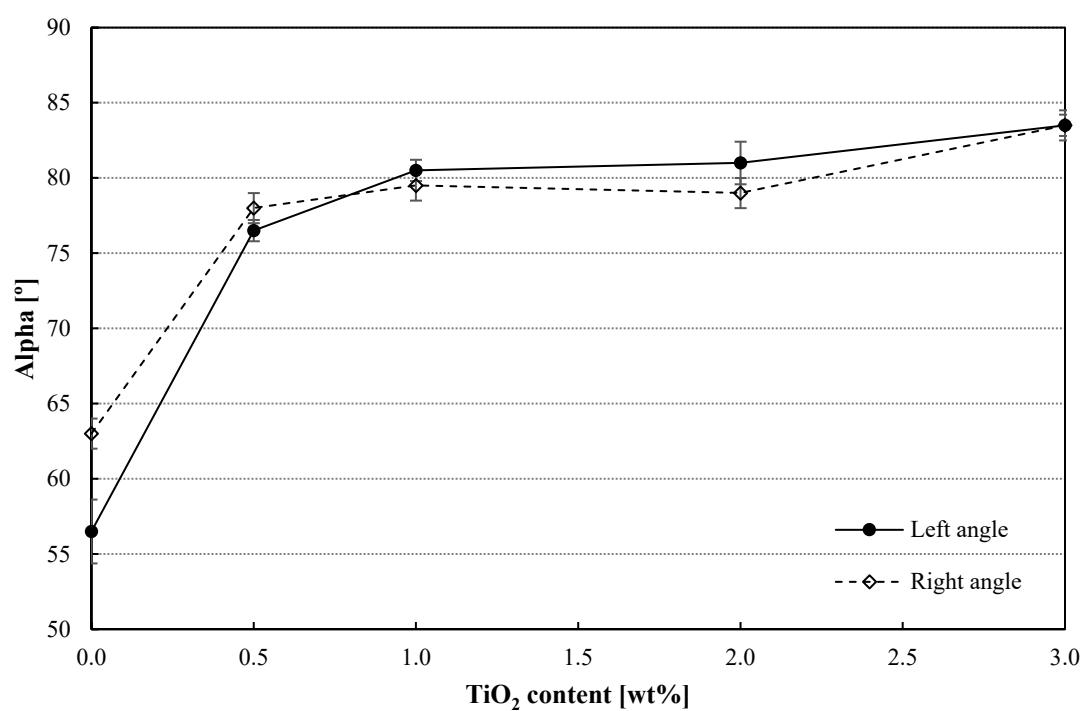


Figure S3. Contact angle for the different TiO₂ concentrations.

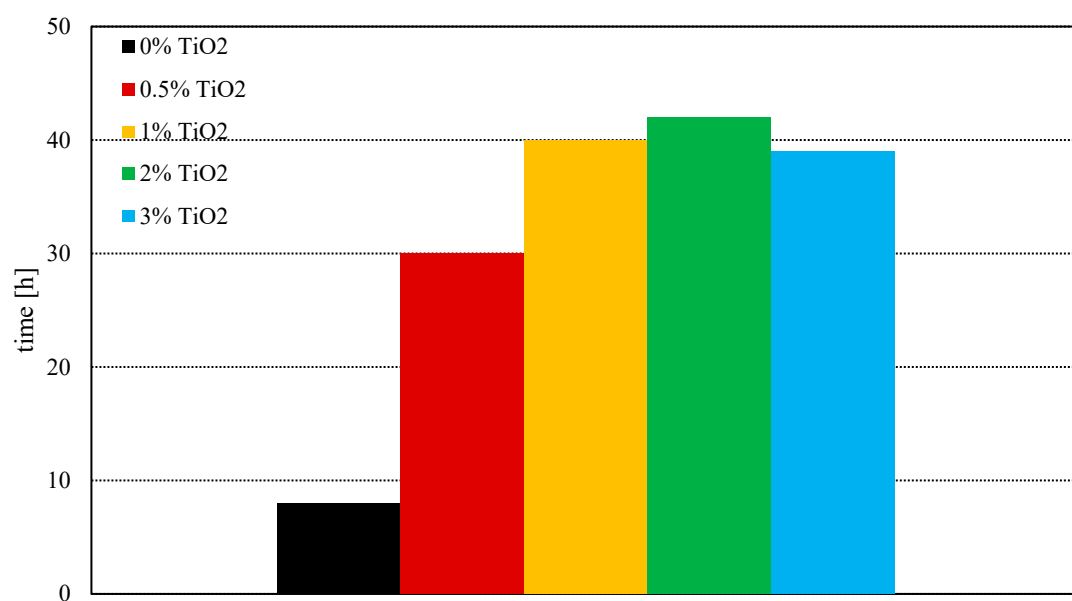


Figure S4. Chemical stability test. Time at which each membrane failed.

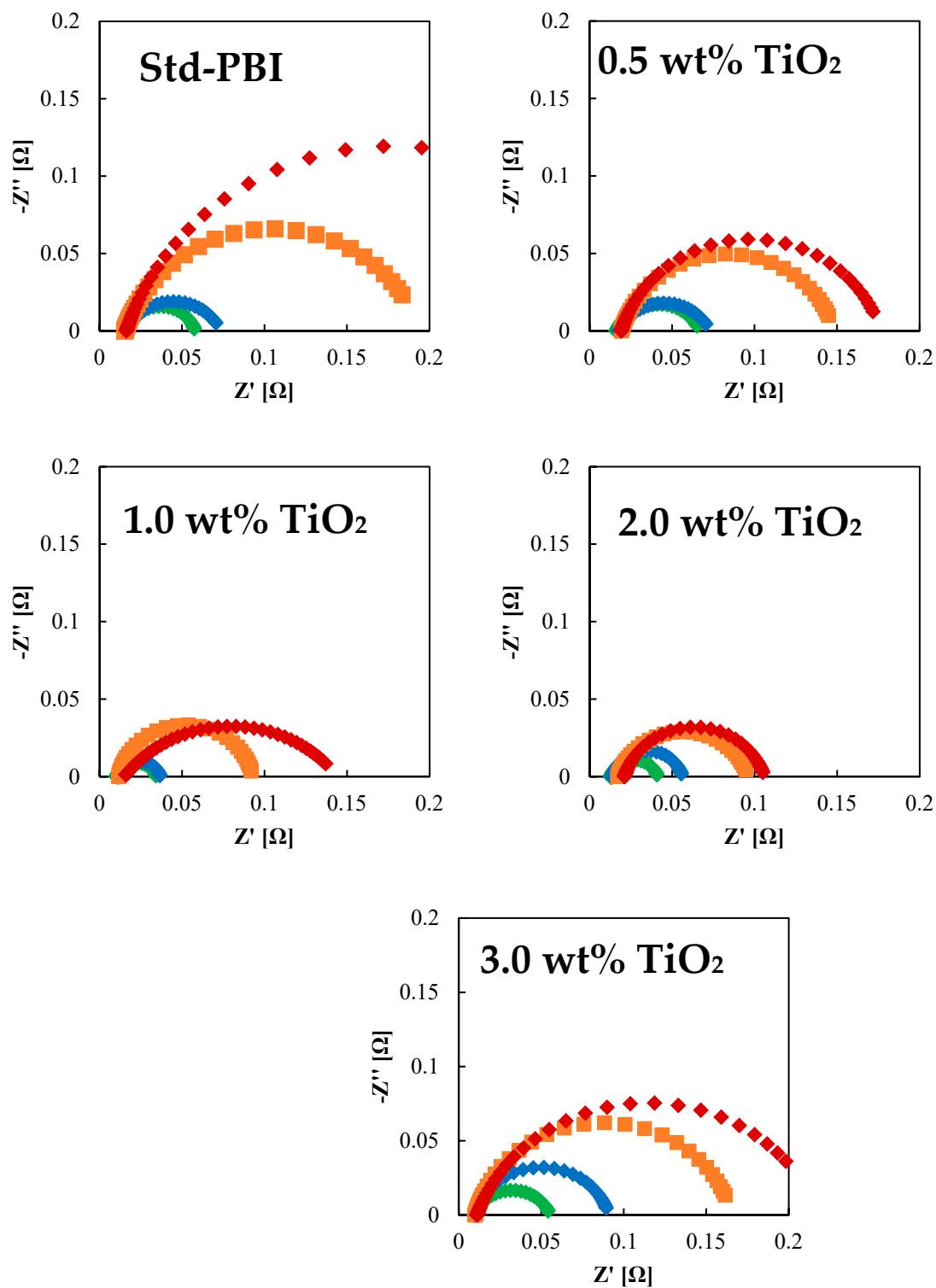


Figure S5. Nyquist plots at 0.7 V for the studied membranes. Green dots: 110 °C; Blue dots: 120 °C; Orange dots: 130 °C; Red dots: 140 °C.

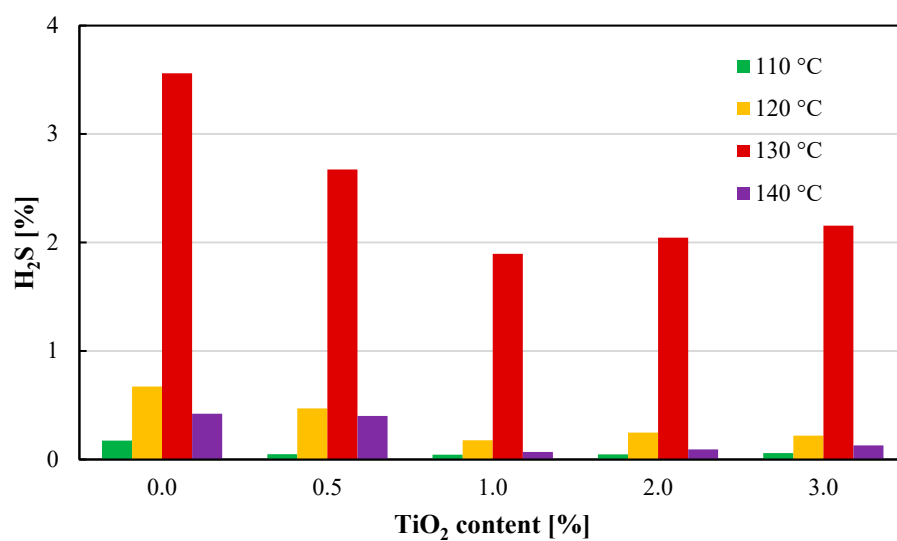


Figure S6. H₂S contents in the cathode outlet measured at 0.6 V.

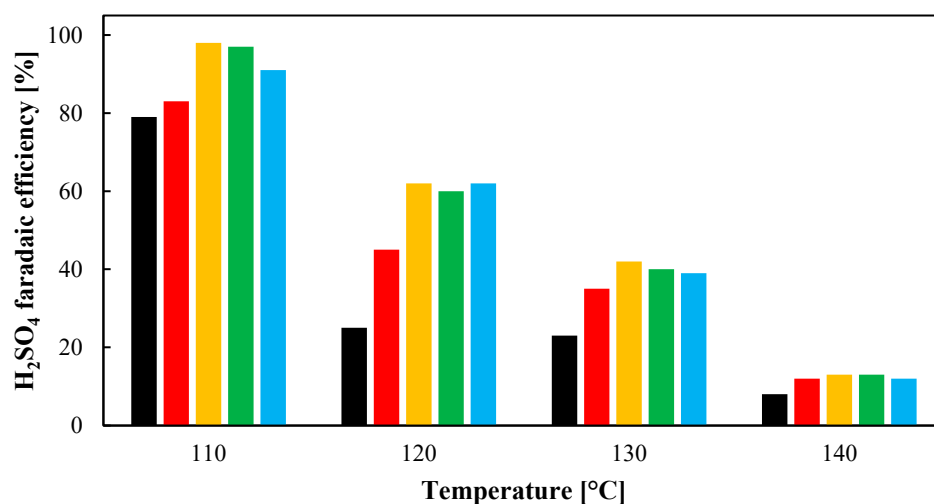


Figure S7. H₂SO₄ production efficiency in the anode measured at 0.6 V. Black column: Std-PBI; Red column: 0.5 wt% TiO₂-PBI; Yellow column: 1.0 wt% TiO₂-PBI; Green column: 2.0 wt% TiO₂-PBI; Blue column: 3.0 wt% TiO₂-PBI.

Table S1. SO₂ crossover flux.

| Membrane | Crossover flux [mol SO ₂ cm ⁻² s ⁻¹ · 10 ⁻⁵] | | | |
|-------------------------------|---|--------|--------|--------|
| | 110 °C | 120 °C | 130 °C | 140 °C |
| Std-PBI | 3.40 | 3.56 | 4.23 | 4.50 |
| 0.5 wt% TiO ₂ -PBI | 3.07 | 3.15 | 3.73 | 4.21 |
| 1.0 wt% TiO ₂ -PBI | 2.32 | 2.57 | 3.40 | 3.98 |
| 2.0 wt% TiO ₂ -PBI | 1.74 | 1.99 | 3.07 | 3.80 |
| 3.0 wt% TiO ₂ -PBI | 1.53 | 1.70 | 2.90 | 3.66 |