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Self-Assembly of Graphene-Induced Polyvinylidene Fluoride Membranes for Water treatment, Energy Regeneration and Environmental Remediation

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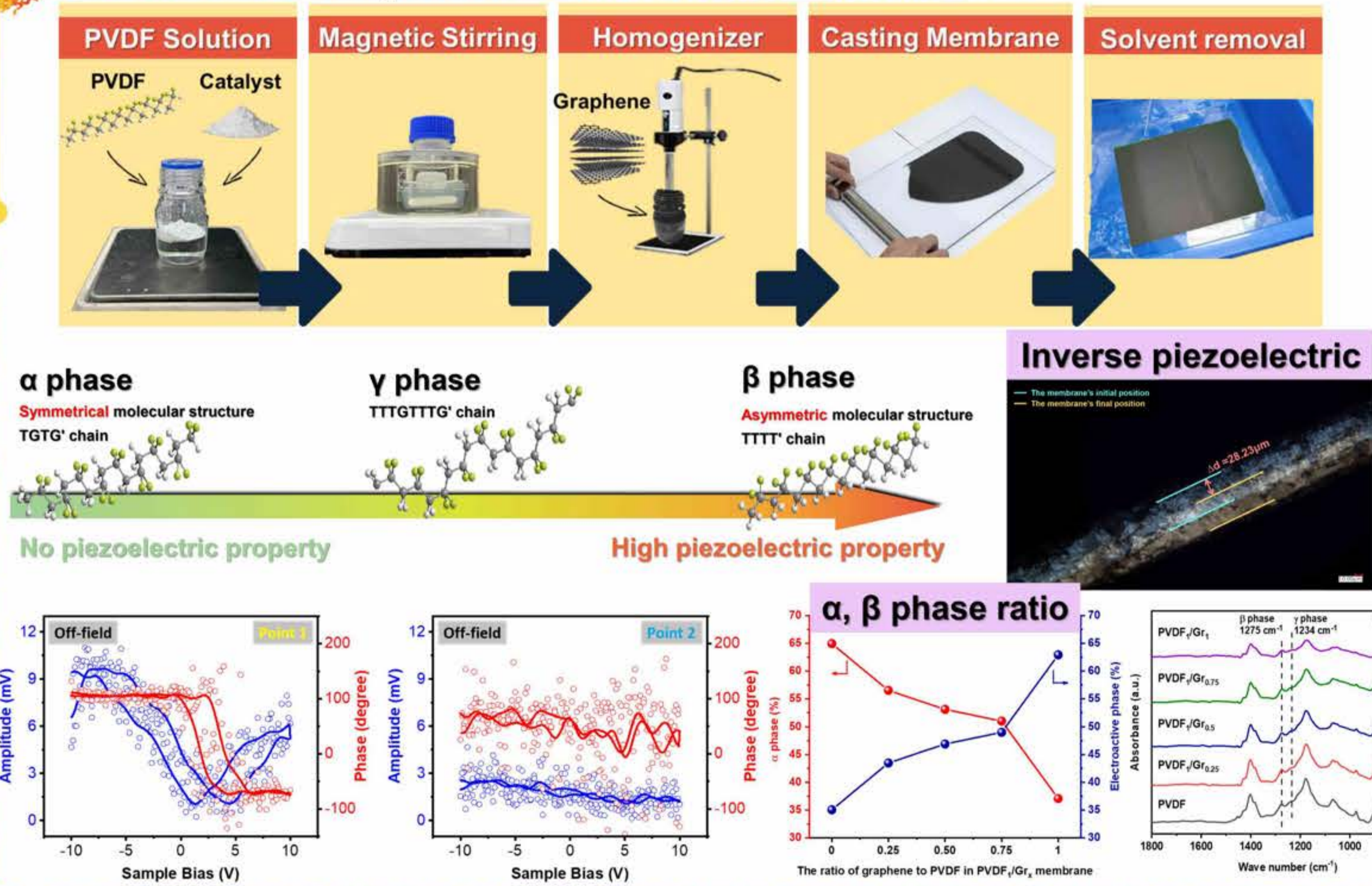


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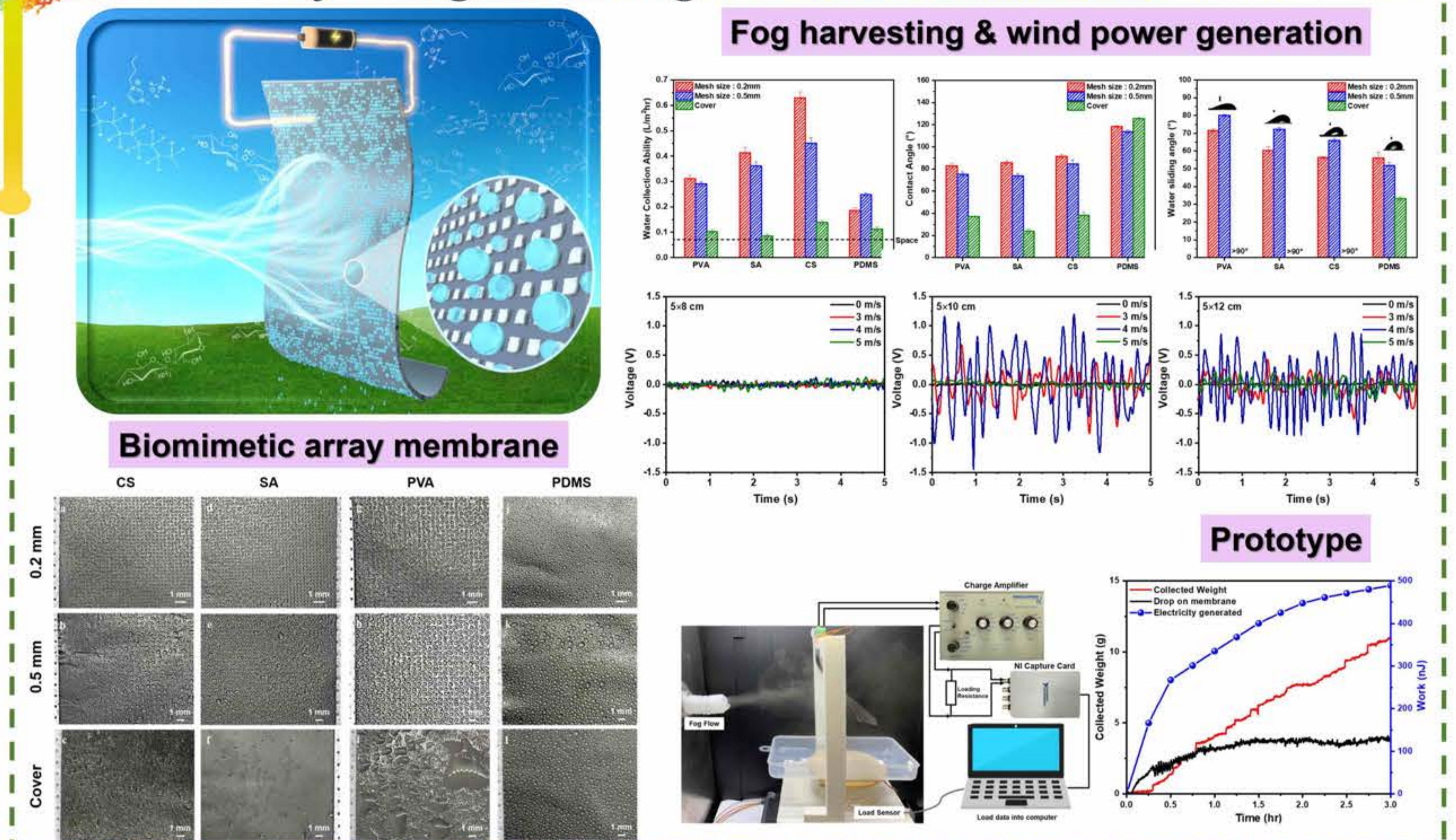
Abstract

Water and energy shortages, as well as environment disruption, have garnered widespread attention in recent years. Membrane technology is one of the effective solutions to address these issues. Polyvinylidene fluoride (PVDF), a commonly used membrane materials, showcases a distinctive β -crystalline phase known for its excellent piezoelectric properties. However, inducing crystal alignment through electric polarization results in high energy consumption and costs. Therefore, in this study, we prepared PVDF membranes induced by graphene self-assembly. Our investigation focus on analyzing the mechanism governing membrane's crystallization and orientation behavior by varying graphene content. We explored the feasibility of piezoelectric membranes in applications such as water treatment, energy regeneration. This study propose to provide the potential solutions for today's challenges of resource scarcity and environmental disruption.

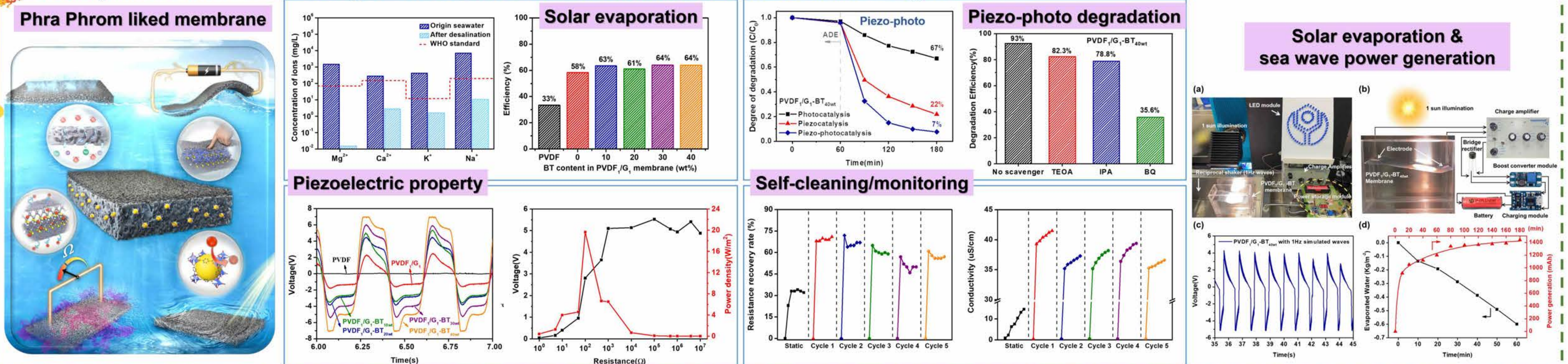
Membrane Preparation and Characterization



Membrane for Fog harvesting and Wind Power Generation



Multifunctional Membrane for Environmental Remediation and Resource Regeneration



Selected Publication

- [1] C.H. Huang, J.X. Huang, Y.H. Chiao, C.M. Chang, W.S. Hung, S.J. Lue, C.F. Wang, C.C. Hu, K.R. Lee, H.H. Pan, Tailoring of a piezo-photo-thermal solar evaporator for simultaneous steam and power generation, *Advanced Functional Materials* 31(17) (2021) 2010422.
- [2] T.H. Huang, M.-J. Shih, Y.-Y. Chen, H.F.M. Austria, O. Setiawan, C. Wu, X. Lu, L. Zhang, W.-S. Hung, Graphene-based biomimetic array film for simultaneous fog water harvesting and wind power generation, *Chemical Engineering Journal* 476 (2023) 146519.
- [3] T.H. Huang, X.Y. Tian, Y.Y. Chen, J. Widakdo, H.F.M. Austria, O. Setiawan, T. Subrahmanya, W.S. Hung, D.M. Wang, C.Y. Chang, Multifunctional Phra Phrom-like Graphene-Based Membrane for Environmental Remediation and Resources Regeneration, *Advanced Functional Materials* (2023) 2308321.



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