Materials & Chemicals

WAFER-SCALE PIEZOELECTRIC BIO-ORGANIC THIN FILMS

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The Invention

UW-Madison researchers have developed a new approach to creating piezoelectric biomaterial thin films based on γ glycine crystals. The flexible piezoelectric glycine thin films were synthesized at the wafer-scale by directly evaporating the solvent from a solution of glycine and polyvinyl alcohol (PVA). The as-received film automatically assembles into a PVA-glycine-PVA sandwich heterostructure as it salted out. Strong hydrogen bonding between the O atoms in glycine and -OH groups on PVA chains are responsible for the nucleation and growth of the piezoelectric γ-glycine and alignment of the domain orientation. The sandwiched heterostructure was critical to introduce long-range self-aligned PVA-glycine interaction, leading to strong macroscopic piezoelectricity. Such a heterostructure also significantly improved the flexibility and mechanical integrity, converting rigid glycine crystals into a flexible thin film. Films with appropriate glycine-to-PVA ratios exhibit nearly an order of magnitude enhancement of the mechanical flexibility compared to pure glycine crystals, as well as superb piezoelectric performance, comparable to commercial piezoelectric soft materials such as PVDF.

Additional Information

For More Information About the Inventors

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Tech Fields

- Materials & Chemicals : Composites

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867