The Bending Boost: Polarization Pathways to Enhanced Photostriction and Photovoltaics

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Flexoelectricity—the coupling between strain gradients and electric polarization—has emerged as a universal and scalable mechanism for electromechanical interaction that is particularly large in nanoscale and/or inhomogeneous systems. Recent investigations have expanded this concept into the optoelectronic domain, leading to the demonstration of the flexophotovoltaic effect[1,2], wherein strain gradients enable large photovoltages in materials under bending and, conversely, the photoflexoelectric effect[3], whereby light enhances the output of electromechanical energy-harvesting devices. Meanwhile, photostriction—the deformation of polar materials under illumination—offers a direct pathway for optically driven mechanical actuation [4].

In this contribution, I will summarize our current understanding and recent advances in these coupled phenomena. The take-home lesson is that the advent of flexible electronics enables unprecedented possibilities for transducers that convert light into electricity and/or motion via bending.

References

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