Multifunctional Hybrid Materials for Energy Conversion in Photovoltaics

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Hybrid organic-inorganic materials are increasingly relevant for emerging energy technologies.[1] In particular, metal halide perovskites have become one of the leading semiconductors for solar-toelectric energy conversion in photovoltaics.[2–3] However, their operational instability hinders practical applications.3 While this can, to an extent, be overcome by incorporating organic moieties within hybrid perovskite frameworks that form low-dimensional architectures with superior operational stabilities, their electronically insulating character often compromises the resulting photovoltaic performances.[3–5] This issue will be addressed by discussing the capacity of supramolecular engineering in the design of adaptive bio-inspired materials[3] and the use of (photo)electroactive organic species to enhance the functionality of hybrid perovskites by enabling control in response to external stimuli,[4] such as voltage bias,[5] light,[6] and pressure,[7] opening a path toward multifunctional materials and smart photovoltaics.



Schematic of multifunctional perovskite materials responsive to external stimuli, such as pressure.[7]

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Acknowledgments: The work presented is the result of a collaborative effort across research groups and institutions, in particular at the Adolphe Merkle Institute of the University of Fribourg, EPFL, and PSI in Switzerland, Max Planck Institute for Solid-State Research in Germany, and AMOLF in The Netherlands, as detailed in the references. The speaker is grateful to collaborators, co-workers, and funding support from the Swiss National Science Foundation, Adolphe Merkle Institute, and NCCR Bio-Inspired Materials.