

Emerging Materials and Devices for Energy Harvesting Applications

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Abstract: Energy harvesting as well as storage is emerging as a viable method for electronic devices to utilize ambient energy from the surrounding environment and convert it into electrical energy for storage. This technology offers devices that has the potential to serve as an alternative power supply instead of batteries that are ubiquitous in IoT devices, autonomous wireless devices such as in wearables and sensors. Conventional devices require vacuum based technologies to be produced which brings energy intense production and tedious processing methods. Solution- processed semiconductors including organic materials, metal-halide perovskites and quantum dots — have recently emerged as candidates for next-generation energy harvesting devices. They combine ease of processing, controllable optoelectronic properties, facile integration with complementary metal–oxide–semiconductors, compatibility with flexible substrates and good performance. They offer flexibility, stretchability and even healability are promising for such future devices used for sensors, printed circuits, printed diagnostics etc. This talk will focus on the state of the art of solution processed emerging materials and enabled devices for energy conversion and harvesting. In particular, solar cells and thermoelectric materials and devices will be elaborated and their suitability for printed electronics will be discussed.

Bio: Derya, originally from Turkey, is a passionate scientist who received her doctorate degree from Friedrich-Alexander Erlangen-Nürnberg University in Materials Science and Engineering in 2014. Since 2017, she is an assistant professor at King Abdullah University of Science and Technology (KAUST), Saudi Arabia. Her research group (OMEGALAB) focus on engineering organic and hybrid materials for energy harvesting devices. Derya co-authored more than 100 publications including Nature Materials, Nature Materials Reviews, Science etc. and is a recipient of Helmholtz Association postdoc grant in 2015 (joint with Imperial College London). She was selected for MIT Technology Review's 2018 list of '35 Innovators under 35' for her development of transparent power glass that can generate electricity and block the heat for greenhouses and future buildings. As a scientist and entrepreneur, she strives to be a role model to younger generations.