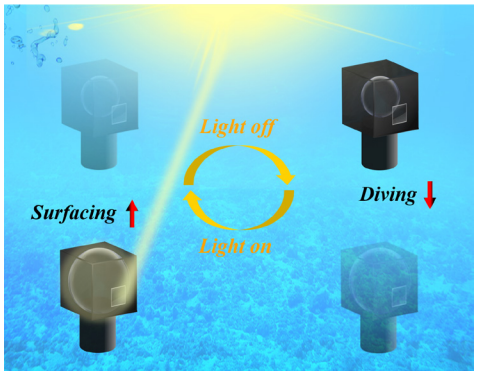
XiaoYang et al., Int J Mater Sci Res. 2018
http://dx.doi.org/10.18689/2638-1559.a2.004

Electricity Generation through Light-Responsive Diving-Surfacing Locomotion of a Functionally Cooperating Smart Device

XiaoYang[1]*, FengShi[1,2]*, MengjiaoCheng[1], LinaZhang[1], Shu Zhang[1] and **Xiaolin Liu[1]**
[1]Beijing University of Chemical Technology, China
[2]Beijing Advanced Innovation Center for Soft Matter Science and Engineering, Beijing University of Chemical Technology, China



Mini-generators converting other forms of energy into electric energy are ideal power supplies for widely used microelectronic devices because they need only a low power supply in the range of μW to mW. Among various creative strategies to fabricate mini-generators, recently developed functionally integrated systems combining self-propulsion of small objects and the application of Faraday's law show advantages, such as facile, noncontact, low resistance and durable. However, wide application of such functionally integrated systems is currently restricted by artificial energy inputs, such as chemical fuels or mechanical work, and harvesting energy available in the environment or nature is urgently required. Herein, we have developed a light-responsive functionally cooperating smart device as a mini-generator that can directly harvest naturally available light energy for diving-surfacing motions, thus converting mechanical energy into electricity through Faraday's law. The mini-generator generates a maximum voltage of 1.72 V with an energy conversion efficiency of 2.44×10^{-3} % to power LEDs and shows a lifetime of at least 30,000 s. By using environmental energy, this study may promote the concept of a functionally cooperating system as an economic and facile power supply for microelectronics, reducing their dependence on batteries.