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Majority carrier modulation using contact area ratio between graphene and liquids for harvesting blue energy

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Harvesting energy from ambient water is highly desirable, especially for realizing self-powered electronic devices. Graphene is a functional material which can be utilized to harvest the energy. To improve the factors of generating voltage by the graphene, we designed an experimental device which can be used to generate electricity through ambient water motions. We discussed various contact ratio (w/L) of graphene exposed to the liquids influencing the induced voltage. The photoresist is used to define the contact ratio (w/L) of the liquids flowing through the graphene. It was found that the contact ratio of 40% ($w/L=0.4/1$) and 60% ($w/L=0.6/1$) would generate the maximum value of the induced voltage. However, the induced voltage of the contact ratio 50% ($w/L=0.5/1$) is lower than the contact ratio of 40% ($w/L=0.4/1$) and 60% ($w/L=0.6/1$). The diagram for the induced voltage with different contact ratios showed an M-type symmetrical structure. The type of majority carrier can be modulated by changing the contact ratio (w/L) between the graphene and the liquid solution. This work provides the feasibility of energy conversion using graphene chips and a method for majority carrier modulation, allowing the feasibility of the graphene to be more flexible for harvesting blue energies from nature.

Biography

Ruey-Jen Yang is a Chair Professor of Engineering Science at National Cheng Kung University (NCKU) in Taiwan. He received his PhD degree in Mechanical Engineering from University of California at Berkeley in 1982. He has been with the NCKU since 1993 after 11-year service in USA. His past academic services include Department Chair, Director General of Research and Services Headquarters and University Librarian at NCKU. His research interests include Microfluidics, Nanofluidics, Fluid and Thermal Sciences, Computational Physics, Energy and Nanotechnology. He has published more than 140 papers in high ranking Journals.

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