Prof. Zhou Li

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Title:

Self-powered electronic medical devices and electrical stimulation therapy

Abstract:

Electrical activity is the basis of human life activities. Regulating electrical activity changes the excited and inhibited states of cells, tissues and organs to treat diseases. Nanogenerators are the new type of energy conversion device that convert low-frequency mechanical energy into electrical energy. In addition, it has gained the attention of researchers because of the flexibility, spinnability, high-output voltage, structural and material diversity. We employed nanogenerators to efficiently convert the mechanical energy of human motion into electrical energy and supply power to electrical stimulation devices and biosensors. Then, we developed self-powered electronic medical devices and medical sensors to carry out more systematic research work. For example, the power generated from the heartbeat can be used to drive the cardiac pacemaker to work for a long time, construct symbiotic cardiac pacemaker, as well as complete the research on improving heart rate and treating arrhythmia in the large animal experiments for the first time. Degradable self-powered electrical stimulation devices are used to regulate the growth direction of nerve cells, enhance intercellular integration and regulation of cardiomyocytes, promote osteoblasts proliferation and differentiation, accelerate skin wound healing. Besides, the devices

can be completely absorbed by the body after the disease treatment. There are researches on self-powered cardiovascular biosensors that can realize minimally invasive implantation and have good biocompatibility. These researches focus on self-powered electronic medical devices and electrical stimulation therapy, and have important potential to be transformed into electronic medical devices and medical sensors for clinic treatment.

Biography：

Zhou Li is full Professor in Beijing Institute of Nanoenergy and Nanosystems and School of Nanoscience and Technology, University of Chinese Academy of Sciences, Chinese Academy of Sciences. He received Ph.D. degree from Peking University in 2010, and bachelor degree from Wuhan University in 2004. He studied in Georgia Institute of Technology from 2007 to 2009. He was Associate Professor in School of Biological Science and Medical Engineering, Beihang University from 2010-2015. His research interest focused on bioelectronics, self-powered medical system, nanogenerators, implantable energy harvesting devices, single cell mechanics and nano-biosensors.

Prof. Li has published more than 140 peer-review articles in Nature Rev. Cardio., Sci. Adv., Nature Comm., Adv. Mater., Adv. Energy Mater., Nano Lett., Adv. Funct. Mater., ACS Nano, Nano Energy, Ann. Rev. of Biomed. Engin., Adv. Sci., Small, Research, Adv. Health. Mater. and Sci. Bull. et al. and have been cited more than 7000 times, H-index 45. Prof. Li have 29 granted patents. Prof. Li have been awarded Science and Technology Award of Beijing, “Young Investigator’s Award” of International Federation for Medical and Biological Engineering (IFMBE) and Gold Award of China Association of Inventions. Prof. Li is the Vice-Chairman of Youth Committee in the China Society of Biomedical Engineering, the Young Vice-Chairman of the Life Electronics Branch of the Chinese Institute of Electronics, and the Youth Committee member of the China Society of Biological Engineering. He is supported by the National Science Fund for Distinguished Young Scholars, Beijing Natural Science Foundation for Distinguished Young Scholars, National Youth Talent Support Program, the New Century Excellent Talents of Ministry of Education of China, Beijing Top-

notch Talent Program, and Beijing Nova Program. He is Associate Editor of Science Bulletin, Smart Materials in Medicine, Nano Select and Current Applied Materials, Guest-editor of Advanced Functional Materials, InfoMat and the Editorial board member of Sensors and Actuators Report and Life Science Instrument. He is also invited reviewer for more than 70 SCI journals, including Nature Biomedical Engineering, Nature Electronics, et al.