

미소에너지 하베스팅용 적층 벤더 압전 소자 성능 연구

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Bender-type Multilayer Piezoelectric Devices for Energy Harvesting

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Abstract : Wearable and ubiquitous micro systems will be greatly growing and their related devices should be self-powered in order to avoid the replacement of finite power sources, for example, by scavenging energy from the environment. With ever reducing power requirements of both analog and digital circuits, power scavenging approaches are becoming increasingly realistic. One approach is to drive an electromechanical converter from ambient motion or vibration. Vibration-driven generators based on electromagnetic, electrostatic and piezoelectric technologies have been demonstrated. Among various generator types proposed so far, piezoelectric generator possesses considerable potential in micro system. To overcome low mechanical-to-electric energy conversion, the piezoelectric device should activate in resonance mode in response to external vibration. Normally, the external vibration excretes at low frequency ranging 0.1 to 200 Hz, whereas the resonant frequencies of the devices are fixed as constant. Therefore, keeping their resonant mode in varying external vibration can be one of important points in enhancing the conversion efficiency. We investigated the possibility of use of multi-bender type piezoelectric devices. To match the external vibration frequency with the device resonant frequency, the various devices with different resonant frequency were chosen.