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Wireless power transmission to the medically implantable device using magnetic wire

Yasushi Takemura
Yokohama National University, Japan

Wireless power transmission to a medically implantable device deeply located in the human body is essential to develop future therapeutic and diagnosis technology. We present a power receiving module of 20mW using a thin magnetic wire of 0.25mm diameter. A magnetization reversal in magnetic wires with bistable magnetization states induces pulse voltage in a pick-up coil which has been known as Wiegand effect. A twisted FeCoV wire is one of the optimum material yielding this effect. A $Fe_{0.4}Co_{0.5}V_{0.1}$ wire of 11 nm length was used as the core material in the pick-up coil. An alternating magnetic applied field of 4.8 kA/m at 10 kHz was applied to the wire. The induced voltage to the pick-up coil was measured and the power obtained from this voltage as a power source was evaluated. We achieve the wireless power transmission of 20mW to a medically implantable device under the excitation field condition which can be realized by a body-sized excitation coil with practical power supply. The experimental details and other possible applications including battery-less modules are also discussed in the presentation.

Biography

Yasushi Takemura is professor of the Electrical and Computer Engineering, Yokohama National University, Japan, where he has been since 1993. He received the BS, MS and PhD degrees in Electrical and Electronic Engineering from Tokyo Institute of Technology, Tokyo, Japan, in 1988, 1990 and 1993, respectively. His research interests are magnetics, magnetic sensor, magnetic materials and biomedical application of magnetic nanoparticles. He has published more than 150 papers in reputed journals.

takemura@ynu.ac.jp

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