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Abstract

Wireless power transmission to medically implantable device using magnetic wire

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Abstract:

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 20 mW using a thin magnetic wire of 0. 25 mm 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 Fe0. 4Co0.5V0.1 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 votage to the pick-up coil was measured, and the power obtained from this voltage as power source was evaluated.

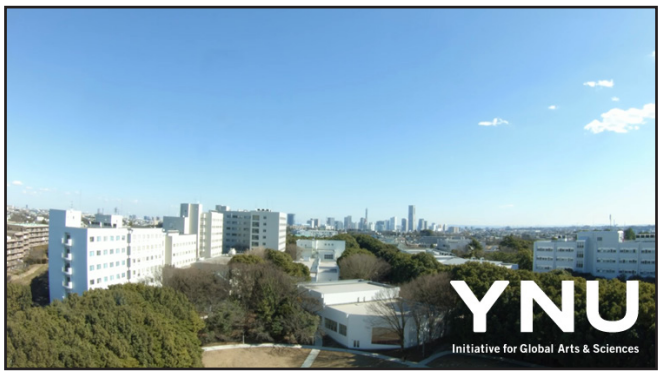
We achieve the wireless power transmission of 20 mW to a medically implantable device under the excitation field condition which can be realized by a body-sized excitation coil with practical power supply. The experimental details and other possible applications including battery-less modules are also 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 B.S., M.S., and Ph.D. 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 bio-medical application of magnetic nanoparticles. He has published more than 150 papers in reputed journals.

Publication of speakers:

- Single-Bit, Self-Powered Digital Counter Using a Wiegand Sensor for Rotary Applications, July 2020
- Magneto-plasmonic nanostars for image-guided and NIR-triggered drug delivery, June 2020



- Two-step relaxation process of colloidal magnetic nanoclusters under pulsed fields, June 2018
- Batteryless Hall Sensor Operated by Energy Harvesting From a Single Wiegand Pulse, June 2017
- Magnetization Reversal and Specific Loss Power of Magnetic Nanoparticles in Cellular Environment Evaluated by AC Hysteresis Measurement, January 2015
- Hybrid magneto-plasmonic liposomes for multimodal image-guided and brain-targeted HIV treatment, September 2017
- Harmonic decomposition of magneto-optical signal from suspensions of superparamagnetic nanoparticles, November 2017
- Complex Magnetization Harmonics of Polydispersive Magnetic Nanoclusters, June 2018
- Giant Magnetic Heat Induction of Magnesium□Doped □□ Fe2O3 Superparamagnetic Nanoparticles for Completely Killing Tumors, December 2017
- Submillimeter magnetic particle imaging with low symmetrical field gradient, September 2020
- Magnetization Characteristics of Oriented Single-Crystalline NiFe-Cu Nanocubes Precipitated in a Cu-Rich Matrix, July 2020

Intenational Webinar on Sensors, December 24, 2020

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