

課題番号 : F-20-UT-0094
 利用形態 : 機器利用
 利用課題名(日本語) :
 Program Title (English) : Development of Rotational Electret Energy Harvester with Synchronous Circuits
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 キーワード/Keyword : リソグラフィ・露光・描画装置, エネルギー関連技術, Energy Harvester

1. 概要(Summary)

A dual-stage electrode design has been presented for electret-based rotational energy harvester (EH) to enable development of a nonlinear circuit called synchronous electric charge extraction (SECE). With the aid of SECE, 400 μ W is obtained on a 5V load at a rotational speed of 1 rps, which is twice of the power obtained with a conventional buck converter.

2. 実験(Experimental)

【利用した主な装置】

超高速大面積電子線描画装置

【実験方法】

A photo mask of a novel dual-stage design is fabricated and developed.

3. 結果と考察(Results and Discussion)

Fig. 1 shows a schematic of the fabricated dual-stage electrode as the stator of the rotational electret EH.

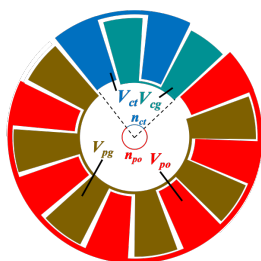


Fig. 1 Radius-based dual-stage electrode for rotational electret energy harvester.

Thanks to the dual-stage design, the load power harvested by the rotational electret energy harvester is increased by 100% if compared with

conventional buck converter with full-bridge rectifier (Fig. 2).

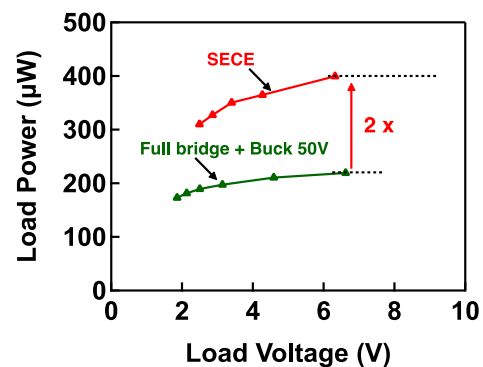


Fig. 2 Measured harvested power as a function of load voltage.

4. その他・特記事項(Others)

- 共同研究者 : Prof. Adrien Badel, SYMME Laboratory, Université Savoie Mont Blanc, France
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5. 論文・学会発表(Publication/Presentation)

Liu, Y., Badel, A., Miyoshi, T., and Suzuki, Y., "Development of Synchronous Electric Charge Extraction Circuit for Rotational Electret Energy Harvester", 第11回マイクロ・ナノ工学シンポジウム, オンライン, 26A3-MN2-1, 2020年10月26日.

6. 関連特許(Patent)

なし