Document details

Lecture Notes in Electrical Engineering
Volume 481, 2019, Pages 493-502
5th International Conference on Computational Science and Technology, ICCST 2018; Kota Kinabalu; Malaysia; 29 August 2018 through 30 August 2018; Code 217739

Simulation and fabrication of micro magnetometer using flip-chip bonding technique (Conference Paper)

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Abstract

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Magnetic field detection has been widely accepted in many applications such as military systems, outer space exploration and even in medical diagnosis and treatment. Low magnetic field detection is particularly important in tracking of magnetic markers in digestive tracks or blood vessels. The presence of magnetic fields' strength and direction can be detected by a device known as magnetometer. A magnetometer that is durable, room temperature operation and having non-movable components is chooses for this project. Traditional magnetometer tends to be bulky that hinders its inclusion into micro-scaled environment. This concern has brought the magnetometer into the trend of device miniaturization. Miniaturized magnetometer is usually fabricated using conventional microfabrication method particularly surface micromachining in which micro structures are built level by level starting from the surface of substrates upwards until completion of final structure. Although the miniaturization of magnetometer has been widely researched and studied, the process however is not. Thus, the process governing the fabrication technique is studied in this paper. Conventional method of fabrication is known as surface micromachining. Besides time consuming, this method requires many consecutive steps in fabrication process and careful alignment of patterns on every layer which increase the complexity. Hence, studies are done to improve time consuming and reliability of the microfabrication process. The objective of this research includes designing micro scale magnetometer and complete device fabrication processes. A micro-scale search coil magnetometer of 15 windings with 600μm thickness of wire and 300μm distance between each wire has been designed. © Springer Nature Singapore Pte Ltd. 2019.

SciVal Topic Prominence

Topic: Magnetometers | MEMS | Force magnetometer

Prominence percentile: 70.412

Author keywords

Magnetometer | Micro-scale | Microfabrication | Miniaturization

Indexed keywords

Engineering controlled terms: Blood vessels | Composite micromechanics | Diagnosis | Flip chip devices | Magnetic fields | Manned space flight | Microanalysis | Microfabrication | Military applications | Miniature instruments | Space research | Structures (built objects) | Surface micromachining

Engineering uncontrolled terms: Conventional methods | Fabrication technique | Micro-scale | Microfabrication methods

Microfabrication process | Miniaturization | Room-temperature operation | Search coil magnetometers

Engineering main heading: Magnetometers

Funding details

Funding sponsor	Funding number	Acronym
International Islamic University Malaysia		

Funding text
Acknowledgments. The authors acknowledge the supports from the Ministry of Higher Education and the International Islamic University Malaysia under grant no. RAGS14-033-0096.

ISSN: 18761100
ISBN: 978-981132621-9
Source Type: Book series
Original language: English
DOI: 10.1007/978-981-13-2622-6_48
Document Type: Conference Paper
Volume Editors: Alfred R.,Ibrahim A.A.A.,Lim Y.,Anthony P.
Publisher: Springer Verlag

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