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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW  
KARYA ILMIAH : JURNAL ILMIAH

Judul Artikel Ilmiah : Development of piezoelectric acoustic sensor with frequency selectivity for artificial Cochlea  
 Nama Penulis : HirofumiShintaku, TakayukiNakagawa, DaiKitagawa, **HartoTanujaya**, SatoyukiKawano, Juichilto  
 Jumlah Penulis : 6 (enam)  
 Status Pengusul : Penulis Pendamping  
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 f. Alamat Web Jurnal: <https://www.sciencedirect.com/science/article/abs/pii/S0924424709005470>  
 g. DOI Artikel : <https://doi.org/10.1016/j.sna.2009.12.021>

Kategori Publikasi Buku Ilmiah  
(beri (√) pada kategori yang tepat)

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Kelengkapan unsur & kualitas penerbit (30%)	97%x30% x 40					11,64
Nilai <i>peer</i> Maksimal (100%)	40					38,2
Kontribusi Pengusul; (nilai akhir <i>peer</i> x bobot penulis pendamping : dibagi 5 penulis = $38,2 \times 40\% : (5) = 3,056$ )						<b>3,056</b>
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Jakarta, 18.12.2019  
Penilai I



(Prof. Dr. Ir. Agustinus Purna Irawan)  
 NIDN/NIP : 0328087102 / 10398021  
 Jabatan/Pangkat/Bidang Ilmu: Professor/IVC/Teknik Mesin  
 Unit Kerja: Fakultas Teknik – Universitas Tarumanagara

KOMENTAR  
PEER REVIEW

1. Tentang kelengkapan dan kesesuaian unsur:

Artikel dengan judul **Development of piezoelectric acoustic sensor with frequency selectivity for artificial cochlea**, ditulis secara benar sesuai dengan standar penulisan artikel ilmiah yang memuat pendahuluan, metode/peralatan yang digunakan, pengambilan data dan data, analisa dan kesimpulan.

2. Tentang ruang lingkup dan kedalaman pembahasan:

Artikel tersebut membahas tentang getaran piezoelektrik yang dikembangkan dengan menggunakan sensor dengan pembahasan yang spesifik dan mudah dipahami.

3. Kecukupan dan kemutakhiran data/informasi dan metodologi;

Metodologi terstruktur dan jelas, data dan referensi yang diambil up to date.

4. Kelengkapan unsur dan kualitas penerbit:

Editorial board dan reviewer untuk Jurnal "**Sensors and Actuators A: Physical**" jelas dan terstruktur dan dapat diakses online. Penerbit Elsevier - Scimedirect dapat dilacak melalui daring, terindeks oleh Scopus dan memenuhi syarat jurnal ilmiah internasional, Q1, SJR (2018) 0,66, dan H Index 139. Jurnal ber ISSN/ISBN.

5. Indikasi Plagiasi:

Artikel dengan judul **Development of piezoelectric acoustic sensor with frequency selectivity for artificial cochlea** yang diterbitkan oleh Elsevier - Scimedirect, dan dapat dibaca secara daring melalui <https://www.sciencedirect.com/science/article/abs/pii/S0924424709005470> dan DOI <https://doi.org/10.1016/j.sna.2009.12.021> , tidak ditemukan indikasi plagiasi dengan tingkat kesamaan menggunakan software Turnitin sebesar 5 %.

6. Kesesuaian Bidang Ilmu:

Artikel tersebut membahas tentang sensor getaran piezoelektrik dan ada Linieritas keilmuan dengan pengusul.

Jakarta, 18.12.2019  
Penilai I



(Prof. Dr. Ir. Agustinus Purna Irawan)  
NIDN/NIP : 0328087102 / 10398021  
Jabatan/Pangkat/Bidang Ilmu: Professor/IVC/Teknik Mesin  
Unit Kerja: Fakultas Teknik – Universitas Tarumanagara

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Kelengkapan dan kesesuaian unsur isi <i>prosiding</i> (10%)	4					3,8
Ruang lingkup dan kedalaman pembahasan (30%)	12					11,4
Kecukupan & kemutakhiran data/informasi dan metodologi (30%)	12					11,52
Kelengkapan unsur & kualitas penerbit (30%)	12					11,64
Total = 100%	40					38,36
Kontribusi Pengusul;(nilai akhir <i>peer</i> x bobot pendamping :dibagi 5 penulis pendamping)= 38,36 x 40% :(5) = 3,069						3,069
Komentar/Usulan <i>Peer Review</i> :	1. Tentang kelengkapan dan kesesuaian unsur: 2. Tentang ruang lingkup dan kedalaman pembahasan; 3. Kecukupan dan kemutakhiran data/informasi dan metodologi; 4. Kelengkapan unsur dan kualitas penerbit: 5. Indikasi Plagiasi: 6. Kesesuaian Bidang Ilmu: <i>Terlampir</i>					

Jakarta, 14-11-2019  
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(Dr. Ir. M. Sbbbron Yamin L., M.Sc.)  
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 Unit Kerja: Fakultas Teknik – Universitas Tarumanagara



<p>KOMENTAR PEER REVIEW</p>	<p>1. Tentang kelengkapan dan kesesuaian unsur:</p> <p>Artikel <b>Development of piezoelectric acoustic sensor with frequency selectivity for artificial cochlea</b>, ditulis sesuai dengan kaidah penulisan artikel ilmiah yang meliputi pendahuluan, metode/alat, data dan analisa serta kesimpulan.</p> <p>2. Tentang ruang lingkup dan kedalaman pembahasan:</p> <p>Artikel tersebut membahas tentang getaran piezoelektrik yang dikembangkan dengan menggunakan sensor dengan kedalaman pembahasan yang spesifik.</p> <p>3. Kecukupan dan kemutakhiran data/informasi dan metodologi;</p> <p>Data yang diambil dan digunakan untuk analisa dan referensi tergolong baru dan mutakhir, dengan susunan metodologi yang baik.</p> <p>4. Kelengkapan unsur dan kualitas penerbit:</p> <p>Editor dan reviewer Jurnal <b>“Sensors and Actuators A: Physical”</b> tersusun dan terorganisir, ber ISSN/ISBN dan dapat diakses online. Penerbit <b>Elsevier - Scencedirect</b> dapat dilacak melalui daring, terindeks oleh <b>Scopus dan memenuhi syarat jurnal ilmiah internasional, Q1, SJR (2018) 0,66, dan H Index 139.</b></p> <p>5. Indikasi Plagiasi:</p> <p>Artikel <b>Development of piezoelectric acoustic sensor with frequency selectivity for artificial cochlea</b> diterbitkan oleh Elsevier - Scencedirect, dan dapat dibaca secara daring melalui <a href="https://www.sciencedirect.com/science/article/abs/pii/S0924424709005470">https://www.sciencedirect.com/science/article/abs/pii/S0924424709005470</a> dan DOI <a href="https://doi.org/10.1016/j.sna.2009.12.021">https://doi.org/10.1016/j.sna.2009.12.021</a> , tidak ditemukan indikasi plagiasi.</p> <p>6. Kesesuaian Bidang Ilmu:</p> <p>Artikel tersebut membahas tentang sensor getaran piezoelektrik dan ada kesesuaian dan linieritas keilmuan dengan pengusul.</p>
---------------------------------	--

Jakarta, 14-11-2019

Penilai U

(Dr. Ir. M. Sobron Yamin L., M.Sc.)

NIDN/NIP : 0114056705 / 10311009

Jabatan/Pangkat/Bidang Ilmu: Lektor Kepala/IV/Teknik Mesin

Unit Kerja: Fakultas Teknik – Universitas Tarumanagara

# Sensors and Actuators, A: Physical

# 139

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# Development of piezoelectric acoustic sensor with frequency selectivity for artificial cochlea

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## ABSTRACT

In this paper, we report a novel piezoelectric artificial cochlea which realizes both acoustic/electric conversion and frequency selectivity without an external energy supply. The device comprises an artificial basilar membrane (ABM) which is made of a 40 μm thick polyvinylidene difluoride (PVDF) membrane fixed on a substrate with a trapezoidal slit. The ABM over the slit, which mimics the biological system, is vibrated by acoustic waves and generates electric output due to the piezoelectric effect of PVDF. The width of ABM is linearly varied from 2.0 to 4.0 mm along the longitudinal direction of 30 mm to change its local resonant frequency with respect to the position. A detecting electrode array with 24-elements of 0.50 × 1.0 mm rectangles is made of an aluminum thin film on ABM, where they are located in a center line of longitudinal direction with the gaps of 0.50 mm. Since the device will be implanted into a cochlea filled with lymph fluid in future, the basic characteristics in terms of vibration and acoustic/electric conversion are investigated both in the air and in the silicone oil which is a model of lymph fluid. The in vitro optical measurements show that the local resonant frequency of vibration is varied along the longitudinal direction from 6.6 to 19.8 kHz in the air and from 1.4 to 4.9 kHz in the silicone oil, respectively. Since a resonating place vibrates with relatively large amplitude, the electric output there becomes high and that at the other electrodes remains to be low. Thus, the electric voltages from each electrode realize the frequency selectivity. Furthermore, the effect of surrounding fluid on the vibration is discussed in detail by comparing the experimental results with the theoretical predictions obtained by the Wentzel–Kramers–Brillouin asymptotic method. The theoretical prediction indicates that the surrounding fluid of the higher density induces the larger effective mass for the vibration that results in lower resonant frequency. From these findings, the feasibility of artificial cochlea is confirmed both experimentally and theoretically.

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## 1. Introduction

The conventional hearing loss is a type of deafness which is

sound processor and a battery. The acoustic sound is detected and is analyzed with respect to the frequency by the extracorporeal device. The processed signals are transformed through a transducer.

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