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Assoc. Prof. Syah Alam S Pd, MT, PhD <syah.alam@trisakti.ac.id>

Thank you for your submission for PIER Journals 24020201

1 message

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Key: 24020201
Title: UHF-Band Solid Sensor Based on Tweaking Electric Field Coupled Resonator for Material Characterization
Corresponding Author: Dr. Syah Alam
Target Journal: Others
Special Issue Information:
Invited: NO

Time: 2024-02-02
From: 118.136.171.223

Uploaded file(s):
UHF-Band Solid Sensor Based on Tweaking Electric Field Coupled Resonator for Material Characterization.pdf,UHF-Band Solid Sensor Based on Tweaking Electric Field Coupled Resonator for Material Characterization.docx

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Assoc. Prof. Syah Alam S Pd, MT, PhD <syah.alam@trisakti.ac.id>

PIER Journals Revision Request: 24020201.

1 message

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Reply-To: JPIER OFFICE <work@jpier.org>
To: syah.alam@trisakti.ac.id

Dear Dr. Syah Alam:

Your article
Key: 24020201
Title: UHF-band Solid Sensor Based on Tweaking Electric Field Coupled Resonator for Material Characterization
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You can take into account Reviewers' comments and suggestions, and fill in the revision checklist in the "To Do" list.

To expedite the process, the following files are required in this revision stage:

1) The point-by-point answers to the reviewer comments in a separate file.

2) A revised version with clear revision marks.
Please kindly mark revisions in different color or indicate the page and line numbers where the revisions should be made. Revision marks will expedite the checking process by the editors or reviewers.

3) Please DO upload the source files (TEX with EPS or PDF figures, or DOCX files) of the whole revised article to expedite the typeset process.

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Reviewer 1's Comments:
This manuscript uses ECL to detect the permittivity of the material. Using ECL to detect the permittivity is not a new technique. The analysis methods have already published in [20]~[22]. Therefore, the key of the novelty of this

manuscript is to design a high NS ECL. However, in the design section (section 2 and section 3), only modeling and the parameters discussion are included. Therefore, it is suggested to add the design procedure to have high NS ECL in section 3. Further suggestions are listed below:

* In Fig. 1(a), the right side of the ECL does not connect to L4. It should to be corrected.
* In Fig. 6(b), the MUT is mounted on the ECL, what is the requirement of the MUT size? will the gap between the MUT and the PCB board influence the results.

Reviewer 2's Comments:
This paper is suitable and can be published.

Thank you for your contribution.

Yours sincerely

Penina Xie

On behalf of
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Reviewer 1's Comments:

General Response:

We would like to thank the reviewers for their constructive comments. Therefore, we made improvements to the paper that we proposed according to the comments from the reviewers.

Comment #1:

This manuscript uses ECL to detect the permittivity of the material. Using ECL to detect the permittivity is not a new technique. The analysis methods have already published in [20] ~ [22]. Therefore, the key of the novelty of this manuscript is to design a high NS ECL. However, in the design section (section 2 and section 3), only modelling and the parameters discussion are included.

Response:

We would like to thank the reviewers for their constructive comments. We have explained the design process of the ELC resonator in Section 2 (Working principle of proposed sensor) where the structure of the tweaking ELC resonator consists of an inductive arm separated by a gap in the middle of the resonator which is connected to port 1 and port 2 using microstrip line. Based on the simulation results using HFSS 15.0, the highest electric field concentration for a resonance frequency of 0.88 GHz is in the gap between the inductive arms of the ELC resonator. Therefore, we have added the development stages of tweaking the ELC resonator in section 3. The ELC resonator is developed through three stages where the location of the highest electric field is in the gap of the inductive arm of the ELC resonator.

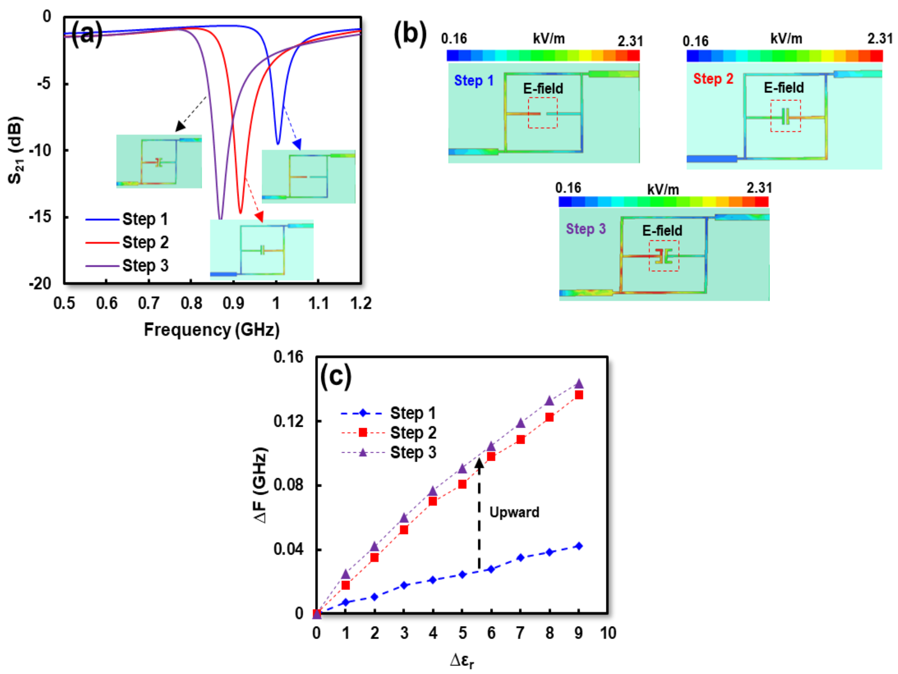

Fig 1. Development model of tweaking ELC resonator, (a) Structure of tweaking ELC resonator, (b) E-field concentration of tweaking ELC resonator, (c) Δf of tweaking ELC resonator

Fig. 1(a) shows that the resonator operates at resonant frequencies of 1.00 GHz, 0.91 GHz and 0.88 GHz for the development of the 1st step, 2nd step and 3rd step models, respectively. Furthermore, the location of the sensing area of the ELC resonator is shown in **Fig. 1 (b)** where the highest electric field is in the middle of the gap between the inductive arms of the resonator. Based on simulations using HFSS 15.0, the highest electric field is obtained in the structure of the 3rd step model. The interaction between the resonator and the MUT is shown in figure 1(c) where the Delta F with a permittivity range of 1 - 10 for the 1st step, 2nd step and 3rd step models is 0.04 GHz, 0.13 GHz and 0.14 GHz, respectively. This finding shows that the maximum Delta F is obtained in the 3rd step model.

Kindly refer Section 3: Simulation of proposed sensor, page 5 and Fig.3, page 6

"The ELC resonator is developed through three stages where the location of the highest electric field is in the gap of the inductive arm of the ELC resonator. Moreover, **Fig. 3(a)** shows that the resonator operates at resonant frequencies of 1.00 GHz, 0.91 GHz and 0.88 GHz for the development of the 1st step, 2nd step and 3rd step models, respectively. Furthermore, the location of the sensing area of the ELC resonator is shown in **Fig. 3(b)** where the highest electric field is in the middle of the gap between the inductive arms of the resonator. Based on simulations using HFSS 15.0, the highest electric field is obtained in the structure of the 3rd step model. The interaction between the resonator and the MUT is shown in **Fig. 3(c)** where the ΔF with a permittivity range of 1 - 10 for the 1st step, 2nd step and 3rd step models is 0.04 GHz, 0.13 GHz and 0.14 GHz, respectively. This finding shows that the maximum ΔF is obtained in the 3rd step model.

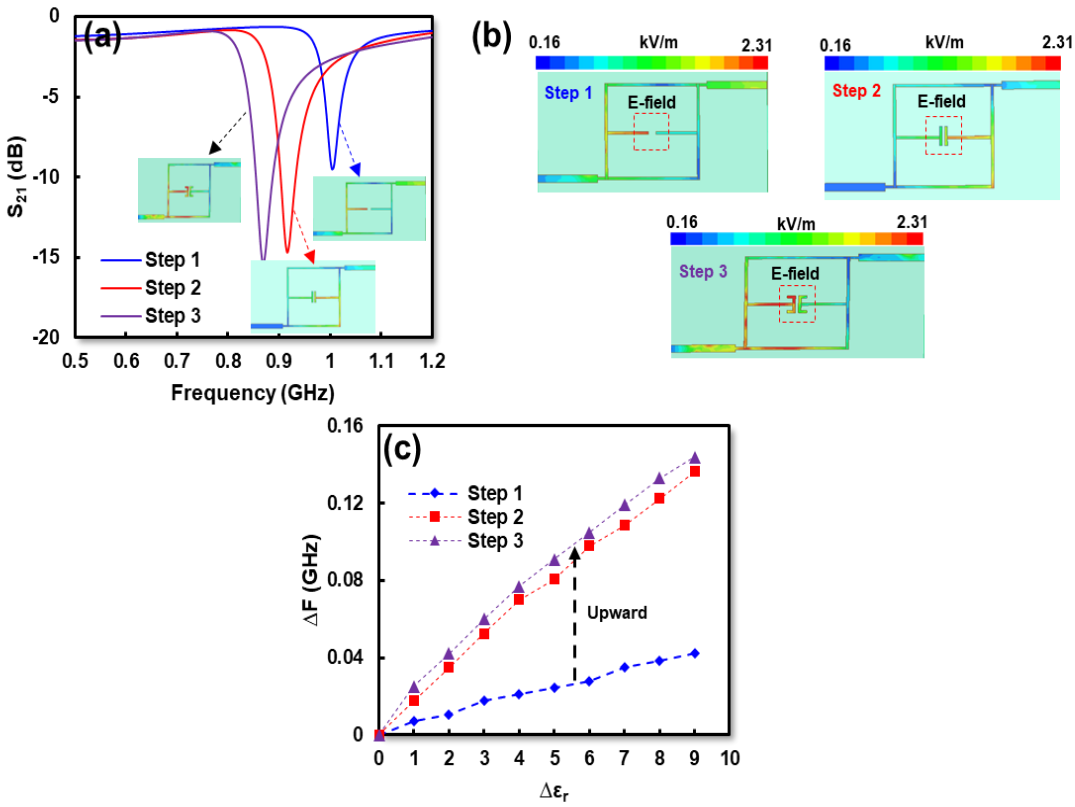

Fig 3. Development model of tweaking ELC resonator, (a) Structure of tweaking ELC resonator, (b) E-field concentration of tweaking ELC resonator, (c) ΔF of tweaking ELC resonator

Comment #2:

In Fig. 1(a), the right side of the ECL does not connect to L4. It should be corrected.

Response:

We would like to thank the reviewers for their constructive comments. Therefore, we have revised **Fig. 1(a)** according to reviewer comments.

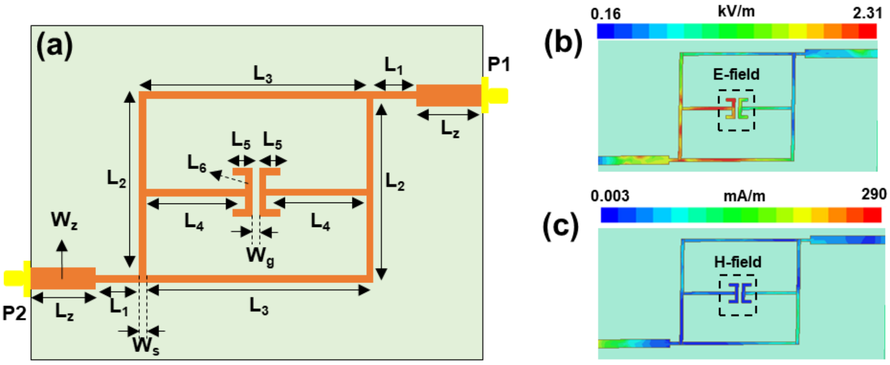

Fig 1. (a) Structure of proposed resonator, (b) E-field concentration at f_r = 0.82 GHz, (c) H-field concentration at f_r = 0.82 GHz

Kindly refer Section 2: Working principles of proposed sensor, page 3 and Fig.1 (a), page 3

"*The proposed microwave sensor is designed based on an ELC resonator with two ports using FR-4 with a permittivity of 4.3, a thickness of 1.6 mm and a tan δ of 0.0265. The structure of the tweaking ELC resonator consists of an inductive arm separated by a gap in the middle of the resonator which is connected to port 1 and port 2 using microstrip line as shown in **Fig. 1 (a)**. The overall dimensions of the ELC resonator are shown in **Table 1**. Furthermore, the electric field and magnetic field concentrations of the ELC resonator were observed using HFSS 15.0. Based on the simulation results, the highest electric field concentration for a resonance frequency of 0.88 GHz is in the gap between the inductive arms of the ELC resonator, while the magnetic field is vanished as shown in **Fig. 1 (b)** and **Fig.1 (c)**. Therefore, the resonator surface with the highest electric field can be used as a sensing area to detect the permittivity of the material.*

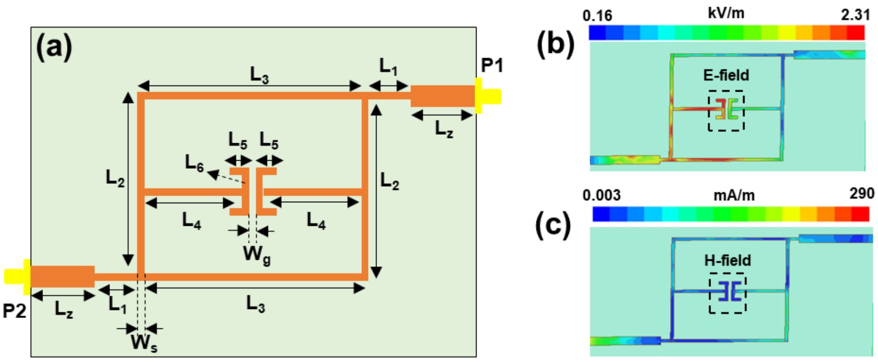

Fig 1. *(a) Structure of proposed resonator, (b) E-field concentration at f_r = 0.88 GHz, (c) H-field concentration at f_r = 0.88 GHz*

Comment #3:

In Fig. 6(b), the MUT is mounted on the ECL, what is the requirement of the MUT size? will the gap between the MUT and the PCB board influence the results.

Response:

We would like to thank the reviewers for their constructive comments. We agree with reviewer comment that the dimensions of the MUT and the air gap between the MUT and the resonator influence the performance of the sensor. Therefore, we have new information about effect of MUT size and gap between MUT and resonator.

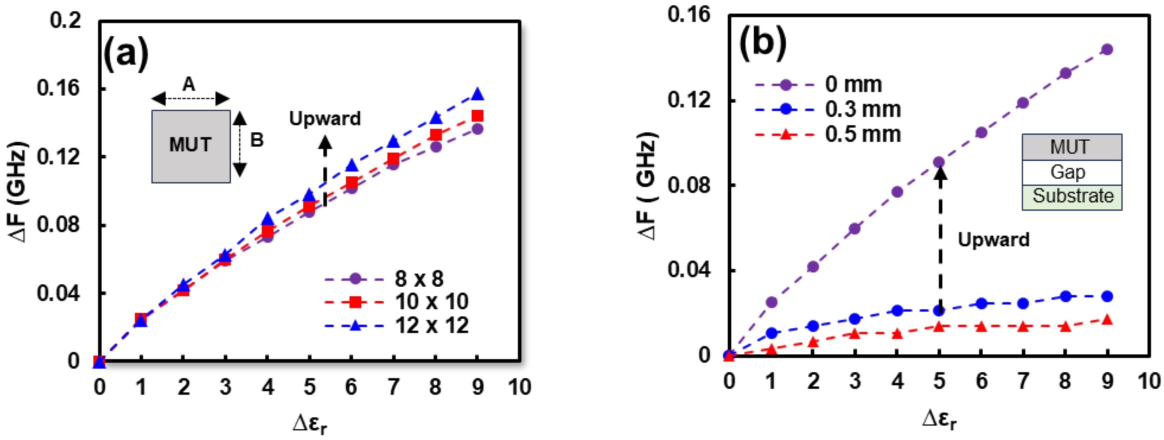

Fig 2. (a) ΔF of sensor based on dimension of MUT, (b) ΔF of sensor based gap between sensor and MUT.

Fig.2 (a) shows that the ΔF of the sensor is influenced by the dimensions of the MUT. The ΔF of the sensor in the permittivity range 1 - 10 with MUT dimensions of 8 mm x 8 mm, 10 mm x 10 mm, 12 mm x 12 mm and thickness of 1 mm is 0.13 GHz, 0.14 GHz and 0.15 GHz, respectively. These findings indicate that the increase in ΔF of the sensor is in line with the increase in the dimensions of the MUT. Furthermore, the effect of the gap between the sensor and the MUT is shown in **Fig. 2(b)** where the ΔF of the sensor with an air gap of 0 mm, 0.3 mm and 0.5 mm is 0.14 GHz, 0.03 GHz and 0.02 GHz, respectively. his finding shows that the maximum ΔF is obtained when the air gap is 0 mm and the MUT is in direct contact with the surface of the sensor.

Kindly refer Section 3: Simulation of proposed sensor, page 8 and Fig.6, page 8

*"Furthermore, the dimensions of the MUT and the air gap between the MUT and the resonator influence the performance of the sensor. **Fig.6 (a)** shows that the ΔF of the sensor is influenced by the dimensions of the MUT. The ΔF of the sensor in the permittivity range 1 - 10 with MUT dimensions of 8 mm x 8 mm, 10 mm x 10 mm, 12 mm x 12 mm and thickness of 1 mm is 0.13 GHz, 0.14 GHz and 0.15 GHz, respectively. These findings indicate that the increase in ΔF of the sensor is in line with the increase in the dimensions of the MUT. Furthermore, the effect of the gap between the sensor and the MUT is*

*shown in **Fig. 6(b)** where the ΔF of the sensor with an air gap of 0 mm, 0.3 mm and 0.5 mm is 0.14 GHz, 0.03 GHz and 0.02 GHz, respectively. his finding shows that the maximum ΔF is obtained when the air gap is 0 mm which means MUT is in direct contact with the surface of the sensor.*

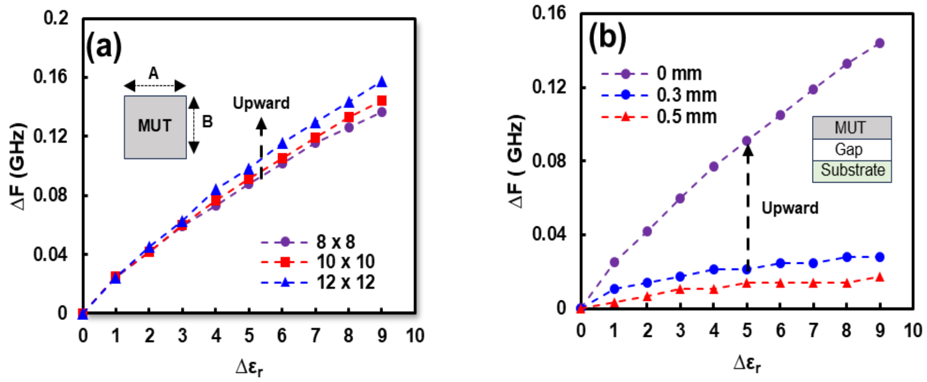

***Fig 5.** (a) ΔF of sensor based on dimension of MUT, (b) ΔF of sensor based on gap between sensor and MUT.*

Reviewer 2's Comments:

This paper is suitable and can be published.

General Response:

We would like to thank the reviewers for their constructive comments. Therefore, we made improvements to the paper that we proposed according to the comments from the reviewers.

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Assoc. Prof. Syah Alam S Pd, MT, PhD <syah.alam@trisakti.ac.id>

PIER Acceptance Notice/Journal Selection and Final Proof Read Request: 24020201.

1 message

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To: syah.alam@trisakti.ac.id

Dear Dr. Syah Alam:

The Editorial Board has recommended, based on considerations of topical relevance, page budget of the journals, review inputs, time constraint for publication, etc., that your article
Key: 24020201
Title: UHF-band Solid Sensor Based on Tweaking Electric Field Coupled Resonator for Material Characterization

may be accepted for publication in
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Thank you for your contribution.

Yours sincerely

Penina Xie

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Dear

Penina Xie

PIER Editorial and Production OFFICE

First, we want to say thank you for your cooperation to process our paper. Here, we proposed the response of your message regarding English Revision Request.

Question 1:

Please provide the full names for SSRR and EQC.

Response:

Square split-ring resonator (SSRR), Equivalent Circuit (EQC)

Question 2:

In the second paragraph of section 3 "The dimensions of the MUT are 10x10mm with a thickness of 1mm and are placed above the sensing area of the resonator," do you mean "The dimensions of the MUT are 10x10mm with a thickness of 1mm, and it is placed above the sensing area of the resonator"?

Response:

Yes, we agree with your recommendation (The dimensions of the MUT are 10x10mm with a thickness of 1mm, and it is placed above the sensing area of the resonator")

Question 3:

In the last paragraph of section 3 "His finding shows that the maximum ΔF is obtained when the air gap is 0 mm," do you mean "This finding shows"?

Response:

Yes, we agree with your recommendation ("This finding shows")

Question 4:

In the last sentence of section 4, if the subject for "operates" is "microwave sensors", then it should be changed to "operate" (plural). Or should "sensor" be singular?

Response:

Yes, we agree with your recommendation (operates changes to be operate), (sensors changes to be sensor)

Question 5 :

In the first sentence of the abstract and section 5, do you mean "a UHF-band microwave sensor" or "UHF-band microwave sensors"?

Response:

Yes, we agree with your recommendation (UHF-band microwave sensor).

Thank you for your information.

Regard

Syah Alam