Date: Nov 16, 2020
To: ********
From: "Physica B" physb@elsevier.com
Subject: Your Submission: PHYSB-D-20-02379
Attachment(s): PHYSB-D-20-02379(S.A-15.11.20).docx

Ms. Ref. No.: PHYSB-D-20-02379
Title: Interpretation of the I-V, C-V and G/ω-V characteristics of the Au/ZnS/n-GaAs/In structure depending on annealing temperature
Physica B: Physics of Condensed Matter

Dear ********,

Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision. Please note that you should not add to the revised manuscript all the references suggested by the reviewer #2. If appropriate, chose 1-2 (the more relevant) from the suggested list.

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Yours sincerely,

Luis Dias Carlos, PhD
Editor
Physica B: Physics of Condensed Matter

Reviewers' comments:

Reviewer #1: Authors are bringing into community the interesting experimental results.
But physical reasons of results are not discussed enought. I recommend a major revision. I have following comments.

1. The information about annealing time is absent.

2. How does the XRD pattern indicate nano crystalline nature?
The peak 28.3 is not broadened enough.

3. The accuracy of parameter determination (e.g., Fig.5, Fig.8) is not specified.

4. The voltage of rectification ratio determination is not specified.

5. Using of equation n=(q/kT)(dV/dlnI) leads to dependence of ideality factor on voltage.
What voltage value was used to determine the ideality factor in the paper?

6. Fig. 1(a) shows the inhomogeneity of ZnS thin film. But spatial inhomogeneity of barrier height is not discussed. For example, a change in the visible barrier height after annealing may be associated with increase in film homogeneity, rather than with metallurgical reactions.

7. On my humble opinion, the log-scale in frequency axis will be better in Fig. 8.

8. It is stated at page 9 " As can be clearly seen from these graphs [Fig.9], the measured G/ω were quite sensitive to applied bias voltage and frequency especially in the depletion region."
But it is not evident.
The reverse voltage leads to increase in depletion region, but reverse characteristics are idendical for all frequencies, all samples, all voltage values.
Besides, the statment "the G/ω values depending on the frequency in D0, D1 and D2 are almost the same, in D3 the G/ω values has decreased significantly." (page 10) does not reflect a monotonic decrease in G/ω value with increasing of annealing temperature in Fig.9.

9. It is necessary to substantiate the physical mechanism of "significant changes in the concentrations of the various charges and traps at the ZnS/n-GaAs interface with thermal annealing".
Generalities about metallurgical reaction, structural changes or new phases formation do not look convincing and require confirmation by experiment or reference data.

10. The main goals of paper are not clear. Why is the ZnS layer used? Has research shown the advantages of a ZnS layer over other materials?

11. The conclusion "the presence of an interfacial layer and surface states between metal and semiconductor can cause significant fluctuations in both electrical and dielectric properties" is far from original.

Reviewer #2: See attached file.

Please ensure that your manuscript is in accordance with the following technical requirements:

1) The level of English should meet the journal's standard. Please check for grammatical and spelling errors, and poorly constructed sentences, and refine the language carefully.
2) A maximum of 6 keywords should be provided.
3) All figures and tables should be captioned, labelled, and cited within the text sequentially. All figures should be clearly readable and of high quality.
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