

Peer Review

Review of: "Negative Capacitance Effect at the Interface Between Si Wafers with Undulating Surfaces"

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The manuscript presents a semiconductor structure exhibiting negative capacitance in the low-frequency region. The effect can be applied with appropriate optimization of the structure. However, several points require clarification.

The authors state that “the average distance between two resistors is designated by the letter d ”, thus **Fig. 2** is not entirely correct, since the figure shows direct contact, for which $d = 0 \mu\text{m}$. Currents I_E and I_P in the figure should be placed near the contact points where they flow.

The authors mention that “a further reduction in the distance between the two resistors changes the contact area and the proportion of tunneling current”. However, contact already “occurs between the two resistors, generating conduction and polarization currents”, and at $d = 0 \mu\text{m}$, the distance cannot decrease further.

The authors indicate for **Figs. 4 and 5** that “ d is set to its minimum value”. It would be helpful to specify whether this minimum value corresponds to $d = 0 \mu\text{m}$.

In **Fig. 6**, the time constant $\tau = R_s C_s$ has a positive value everywhere, even for negative values of capacitance. It is necessary to present an equivalent circuit diagram of the structure to clarify this point. Apparently, the authors consider the series connection of resistance and capacitance, which is not consistent with the dominant role of the tunnel current.

The authors state that “the interfacial electric field strength reaches $6.25 \text{ V}/\mu\text{m}$ ”. It would be helpful to specify for what values of voltage and d and in what contact or non-contact vacuum areas this value is given.

The abstract provides a formula for the tunnel current. To validate the proposed model, it is desirable to measure the tunnel current for different values of dc voltage and distance d for both polarities.

Declarations

Potential competing interests: No potential competing interests to declare.