

Wireless thin film transistor with nanostructured magnetic core structure based on ZnO nanowires

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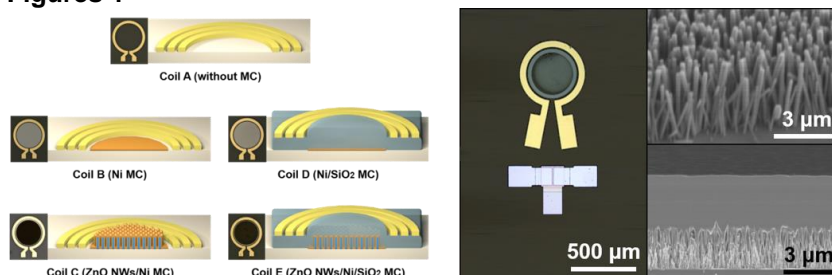
Abstract (Arial 10)

Today, the wearable and implantable medical devices and sensors have played an important role in modern medicine and continuous health monitoring. In the system, wireless delivery of energy to these devices is desirable. Moreover miniaturization of the system is required to avoid the infection and an inconvenience for patients. However, current system remains large in scale due to the complex components and unwieldy size of antennas. Wireless thin film transistor (TFT) with micro antenna structure would be an important component, since it could be applied as an important building block in various devices, as an electrical switch, a rectifier or an amplifier, for various electronics with wireless functionality, since it can provide both simplicity and convenience. It will inspire new device concepts, and it is essential to some applications. One side effect of this micro size antenna is the decrease of transmission efficiency that occurs with scaling down the size of antenna. To improve this low efficiency, we have studied a nanostructured magnetic core (MC) system located in center of the micro antenna design to increase the magnetic flux density without changing the size of the antenna structure. In this study, we investigated an amorphous indium gallium zinc oxide TFT (α -IGZO TFT) with a magnetic induction antenna structure. To incorporate a micro antenna structure into a TFT, a magnetic core (MC) of nickel (Ni) coated zinc oxide nano wires (ZnO NWs) was added to the micro antenna structure as shown in Figure 1. This enhanced the power or the delivered signal efficiency as shown in Figure 2, which was reduced as antenna size becomes smaller. The electrical characteristics and the α -IGZO TFT structure were optimized to improve the wireless transferred power efficiency, considering the increase of self-resonance frequency produced by the antenna size effect. The suggested wireless TFT structure can be a core technology in the field of flexible devices, implantable systems and micro robots, etc

References

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Figures 1



Figures 2

