

How does a 3D interdigital electrode dielectric capacitor work?

It is realized through the transition from the 2D structure to the 3D interdigital electrodes dielectric capacitor. In this case, the specific surface area electrode structure presents exponential increase and dielectric layers thickness decrease, which provide a large capacitance density.

How can 3D nanoscale interdigital electrodes be used in a dielectric capacitor?

By depositing carbon nanotubes in both sets of pores inside the AAO membrane, the new dielectric capacitor with 3D nanoscale interdigital electrodes is simply realized. In our new capacitors, the large specific surface area of AAO can provide large capacitance, whereas uniform pore walls and hemispheric barrier layers can enhance breakdown voltage.

How do you calculate the total capacitance of an interdigital electrode?

For interdigital electrodes with an electrode number $N \geq 3$, the total capacitance C_T of the IDC can be calculated using parallel network analysis (1) $C_T = (N - 3) C_I + 2 C_E$ where C_I and C_E represent the capacitances of the internal unit cell and the external unit cell, respectively.

How do interdigital electrodes work?

The arrangement of the interdigital electrodes with each large-diameter CNT surrounded by six small-diameter CNTs (equivalent to the tubular MIM nanocapacitors, fig. S1) can help the capacitor to form a relatively uniform electric field and better balance the negative and positive charges.

What are interdigital capacitors?

Interdigital capacitors (IDCs) are one of the most used transducers in chemical and biological sensors where a change in capacitance or impedance is measured as a response to the interaction between the analyte and a sensitive layer [1].

Can nickel interdigital capacitors be fabricated on a silicon substrate?

In this article nickel interdigital capacitors were fabricated on top of silicon substrates. The capacitance of the interdigital capacitor was optimized by coating the electrodes with a 60 nm layer of HfO₂. An analytical solution of the capacitance was compared to electromagnetic simulations using COMSOL and with experimental measurements.

However, in an interdigital capacitor, the electrode thickness has a discernible influence on the device capacitance. As shown in Figure 2 d, this electrical property varies ...

Accurately determining the electric field and capacitance in multilayer-structured interdigital electrode capacitor (IDC) transducers is an important prerequisite for designing the ...

Traditional substrates of metallic interdigital electrodes (IEs) are rigid and undeformable, flexible interdigital capacitors are therefore appealing as strain sensors. In this ...

Experimental results obtained with a lumped-constant nine-section S-band Chebyscheff low-pass filter realized using spiral inductors and optimal designed interdigital capacitors are shown to ...

Interdigital Electrodes (IDEs) for capacitance derived from multiple electrode pairs has been connected in parallel with wide proof mass, folded spring beam attached as anchor in the ...

The electrodes of the interdigital capacitor are in the same plane, and the surface of the electrode is covered with a moisture-sensitive film, which has low sensitivity and a fast dynamic response. To improve the ...

Several strategies have been followed to improve the sensitivity of interdigitated electrodes [12], [13], [14], such as geometrical changes. Kim et al. [15] presented a hybrid IDE ...

Numerous technologies uses Interdigital electrode [IDE] capacitors as a key component for sensing mechanism. The present paper aims at studying significance of design parameters of ...

Structural design of flexible interdigital capacitor based upon 3D printing and spraying process Zhige Tu, Zhidong Xia, Weichu Luo et al. ... In-plane supercapacitors are ...

Flexible in-plane architecture micro-supercapacitors (MSCs) are competitive candidates for on-chip miniature energy storage applications owing to their light weight, small ...

However, it is not mandatory to employ double-sided access to the micromachined ultrasound transducer (MUT) with the fringing sensor since the electrodes can ...

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