Knowledge Transfer Office
香港城市大學
City University of Hong Kong

Thin Film Based Structure, Related Flexible Electronic Device And Their Method Of Making

Manufacturing

Consumer Electronics

Electricity and Power Electronics

Robotics

Opportunity

Piezoceramics, which are based on metal oxides, can be used to make flexible electronic devices such as electronic "skin" (flexible, stretchable and self-healing electronics that mimic the functions of human or animal skin), implantable medical devices, and wearable smart systems.

Piezoceramic thin films, such as those with micro or nanoscale thickness, are best suited to the production of flexible electronic devices. In particular, epitaxial growth derived piezoceramic thin films exhibit dielectric, piezoelectric, and ferroelectric properties that are conducive to the effective design of such devices. However, many existing methods of making epitaxial growth derived piezoceramic thin films are complicated, costly, and/or not environmentally friendly. To advance the development of flexible electronic devices, there is a need for a new method of making such thin films that addresses the above shortcomings.

IP Status
Patent filed

Technology Readiness Level (TRL) ? 3

Inventor(s)

Dr. YANG Zhengbao

Dr. LIU Shiyuan

Enquiry: kto@cityu.edu.hk

Technology

Researchers have developed an innovative method of making thin film based structures for various technological applications, including integration into flexible electronic devices. This method first involves forming an electrically conductive layer on a substrate in a way that allows for the removal of the layer. Following this, a ceramic or metallic thin film is deposited on the electrically conductive layer on the side opposite the substrate. The electrically conductive layer and the substrate are arranged such that when their interface comes into contact with a waterbased liquid, it facilitates the release of the electrically conductive layer largely without damage to the substrate. Due to the type of bond between the electrically conductive layer and the substrate, the substrate can be re-used once released.

Advantages

- Compared with existing methods of making thin film structures, the novel method is more environmentally friendly and cost-effective, as the film transfer process generally does not destroy the composition of the substrate or the support layer material.

- In some cases, the thin film structures produced can provide a piezoelectric parameter reaching 209 pm/V, which is much better than that of structures produced using existing methods. This property makes the structures suitable for various technological applications.
- Compared with existing methods, the novel method has the potential for higher generality: it can be applied to obtain a range of freestanding metal or ceramic material thin film structures.

Applications

- Can be used to produce piezoelectric devices
- Can be used for energy harvesting applications
- Can be used in the robotics industry
- Can be used to produce flexible electronics, wearable technology, Internet of Things, and biomedical devices
- Can be used to produce sensors and actuators