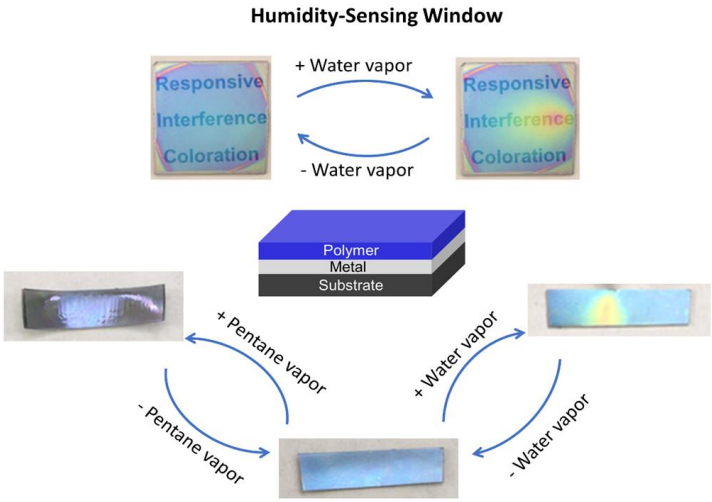
Responsive Interference Coloration Sensors

OTT ID #1610

TECHNOLOGY

Real-time, continuous, colorimetric responsive interference coloration (RIC) sensors can be used for the detection of humidity, organic vapors, pressure, mechanical force, light, temperature or specific chemical species are demonstrated by using different stimuli-responsive polymers. Structural color, such as the color of butterfly wings are caused by the interaction of a precise arrangement of physical structures that interact with light to create an optical effect (like interference, diffraction and refraction). Manufacturing methods to generate these physical structures are generally tedious and costly, resulting in limited commercial use. This invention works as a simple layering technique which exhibits structural color, specifically, the light response of a structure involving a versatile polymer layer backed by a thin versatile metal layer on a substrate.

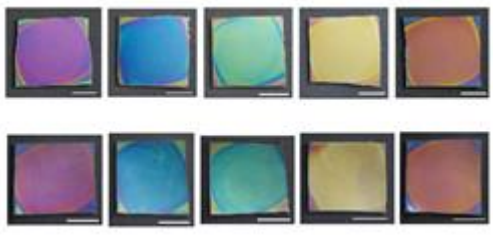
Current competing technologies require many production steps making mass production costly which limits commercial potential. Available films are rigid, lack organic based materials, and may be subject to environmental degradation. The commercial electronic-based humidity sensors are expensive and require power. The commercial paper-based humidity sensors use cobalt chloride, which are cheap and do not require power, but have several major issues: toxicity (cobalt chloride is toxic); non-real-time sensing; limited reliability and shelf life. Our new sensors provide multiple advantages over current competitors and may be valuable in multiple markets.



Self-Reporting, Self-Acting Sensor

FEATURES/BENEFITS

- Lower cost
- Safe/Non-toxic
- Zero power consumption
- Flexible material
- Good processability
- Excellent corrosion resistance
- Light-weight
- Fast, dynamic and reversible response
- Spatial and temporal resolution



INTELLECTUAL PROPERTY

Provisional Patent Application filed November 2018

This technology is part of an active and ongoing research program and is seeking partners for development of the final product. It is available for developmental research support/licensing under either exclusive or non-exclusive terms.

MARKETS

The Global Sensor Market is expected to garner $241 billion by 2022, registering a CAGR of 11.3 % during the forecast period 2016 - 2022. Sensor here is a device that detects physical input such as light, heat, motion, moisture, pressure, or any other entity, and responds by producing an output.

This technology may be valuable as a sensor in any number of market applications such as humidity, temperature, chemicals, biomolecules, light, or mechanical forces. The Global Humidity Sensor Market is expected to reach approximately USD 1.88 billion by 2023 growing at a 15% CAGR over the forecast period 2017-2023 and the Force Sensor Market predicted to be worth 2.95 Billion with a CAGR of 6% by 2023

INVENTORS

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Dr. Jian Chen received his PhD from Fudan University in China. His research is focused on bio-inspired smart materials systems and nanoscale materials. 3D shaping allows rational tailoring of the properties and functions of materials. His group has developed a reprogrammable 3D chemical shaping strategy, without physical molds or templates, for complex 3D shapes. In addition, Dr. Chen is interested in integrating multiple functions into a single material system. His group has developed a variety of multifunctional material systems such as remotely-controlled soft robots, smart sensors, and smart windows. Dr. Chen's group has also developed a new method for in situ chemical probing of vacancy defects in CVD-grown graphene at room temperature, which provides new insightful information on defect formation and healing in graphene.

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