R&D, Sustainability, Materials, Devices & other innovation ideas

Dual mode humidity sensing

The biggest challenge in materials science is the design of materials involving interplay and synergy between multiple physical properties. These materials are an ideal platform for designing devices with application in molecular sensing and switches. We develop hybrid inorganic-organic materials with combined and tunable physical properties, e.g. optical and electrical. Our synthetic strategy involves the controlled assembly of metal ions and organic linkers to form three-dimensional porous networks. This enables the combination within the same crystal lattice of porosity, optical and electrical properties, combination which is not possible in the case of traditional materials, e.g. alloys, inorganic oxides or organic polymers.

Such advanced materials have the advantage of significantly low energy scale, synthetic flexibility, tunable structural characteristics and therefore controllable properties. We use these materials to develop multifunctional sensors. Early this year, we demonstrated that highly reliable dual-mode humidity sensing can be achieved using a specifically designed porous inorganic-organic material. This material has a remarkable high chemical and structural stability, a key requirement for practical application. We are now seeking collaborations to process our material in an appropriate way that allows developing humidity sensors based on both optical and electrical responses. This would open opportunities to design multifunctional sensing devices.

More details on our research can be found at: http://bit.ly/2riimRK

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