



Katerina Lazarova

Bulgarian Academy of Sciences
Bulgaria

Colorimetric thin film humidity Sensors – From material development to Detection

Abstract:

Colorimetric humidity sensors rely on the principles of color change in response to fluctuations in humidity which is often due to the interaction between water molecules and the sensor materials, change of the thickness and/or refractive index and resulting in a shift in the optical properties of the material. These sensors, mostly based on thin films of different materials, usually polymers or inorganic substances, can reversibly change color under varying humidity conditions. Easy detection provided by this method allows using simple visual evaluation of the changes or via spectrophotometry measurements of reflectance/transmittance spectra. In the process of developing such sensors, the main and most important goal is achieving linear dependence on the detected changes with relative humidity RH and exhibiting a short response/recovery time, small hysteresis, good reproducibility and stability. All these properties can be controlled by modifying the materials used, e.g. by synthesis of polymers with different composition and structures or via synthesis of composite materials. Having in mind that the optical response of the sensor is different depending on the characteristics of the thin films and the sensitive materials used, it is important to find the most suitable conditions under which the color change is most significant. The creation of such sensor covers both the selection and modification of the chosen material followed by extensive investigation of sensor`s behavior under changing humidity conditions. Possible applications like optimizing workspaces with real-time environmental monitoring and control of the conditions remotely via IoT, environmental and human body monitoring, etc., are the development trends for future advancements.

Biography

Katerina Lazarova has been a scientist at the Bulgarian Academy of Sciences for the last 10 years. In 2013 she began her doctorate in the field of photonic crystals and optical sensors based on zeolites and porous materials. In 2016 she became a chief assistant at the IOMT-BAS and from 2019 to 2021 was a postdoctoral fellow with a scholarship in the same field. Currently Dr. Lazarova is Associate professor. Author of more than 40 articles, with awards for presentations in scientific forums and participation in numerous scientific projects in collaboration with other scientific organizations.