

## Speaker Karlsruhe Days of Optics & Photonics 2023



### **Abstract: Progress in thermochromic smart windows**

Prof. Dr. Yi Long

Windows associated energy consumption in buildings was estimated at about 4% of primary energy in some developed countries. Thermochromic material responds to solar spectrum differently at the stimulus of heat which makes it attractive in the energy saving smart windows application. The most studied inorganic VO<sub>2</sub> has the intrinsic problems of low luminous transmission (T<sub>lum</sub>) and low solar modulation ( $\Delta T_{sol}$  the transmission difference between high and low temperatures).

Numerous efforts such as employing dopings, nanoparticle-based composites, and nano-porous structuring have been widely studied. Our group have developed some new approaches to tackle this veritable challenge, namely, biomimetic nanostructuring including photonic structure and moth eye, gridded structures, tunable plasmonic structures, organic and hybrid structures. In addition, new active controls has also been applied to thermochromic material to generate a new electro-thermochromics or mechanical-thermochromic materials. The more recent work on radiative cooling regulated smart window suggested the inefficiency of the traditional performance index. The perspective of next generation of smart window will be discussed.

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### **Biography:**

Prof. Dr. Long graduated from University of Cambridge. She is the Fellow of Royal Society of Chemistry and the STEM scholar/professor in the Chinese University of Hong Kong. Her research focuses on smart materials and devices. Her career started with successful lab-to-fab technology transfer to industries including Seagate Technology. Her recent work won Falling Walls Science Breakthroughs of the Year 2022, TOP3 of the Green Awards in the „Energy“ category of the Green Awards in Berlin 2022, TechConnect Innovation Award in Washington 2016. Her research activity was highlighted in Nature and was reported by Reuters, AFP, CNA, MIT technology review and many others.

### **Statement:**

KSOP is a great platform for both research and education for the future development in optics & photonics. I hope my talk could draw attention to the importance of energy saving windows. I am honored to share my expertise in this platform to foster collaboration and build partnership.