



# International Conference on Micro Nano Fluidics (ICOM 2025)



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**Speaker/affiliation:** Prof. Siddhartha Panda, IIT Kanpur, India

**Tentative topic of the invited talk**

*Designing wearable sweat sensors - bioinspired approaches*

**Abstract of the invited talk**

Wearable sensors, which help obtain physiological parameters, are of interest for clinical diagnosis. In this talk, bioinspired approaches to the design of sweat sensors are presented. The talk presents innovative approaches to address the challenge of inadequate sweat volume in non-invasive monitoring of various biomarkers for wearable applications. Three distinct solutions leveraging bio-inspired wettability patterning techniques using PDMS-TiO<sub>2</sub> nanocomposite coatings are presented. The first study introduces a flexible platform with open microfluidic tracks, enhancing sweat collection efficiency through curvilinear wedge designs inspired from *Napenthes alata*. The second study develops a multiplex sensing patch with radially symmetric microchannels inspired from the tentacles of Cnidarian species for simultaneous analysis of multiple biomarkers, demonstrating uniform sweat transport and electrochemical sensing. The third study focuses on a low-volume electrochemical sensor strip for point-of-care immunosensing, featuring desert beetle-inspired wettability pattern and PDMS-TiO<sub>2</sub> coating for highly sensitive detection of specific antigens. Experimental validations and simulation studies confirm the effectiveness and reliability of these approaches, promising significant advancements in wearable sensor technologies and point-of-care testing for diverse physiological parameters and immunosensing applications. The fourth study focuses on a serpentine microfluidic channel design utilizing a wettability patterning for immunosensing applications.