ESI

Nanoengineering TiO_2 for evaluating performance in dye sensitized solar cells with natural dyes

Mohd Jahir Khan[1], Ankesh Ahirwar[1], Vandana Sirotiya[1], Anshuman Rai[2,3], Sunita Varjani[4,5] and Vandana Vinayak[1*]

[1]Diatom Nanoengineering and Metabolism Laboratory (DNM), School of Applied science, Dr. Harisingh Gour Central University, Sagar (MP) 470003, India.

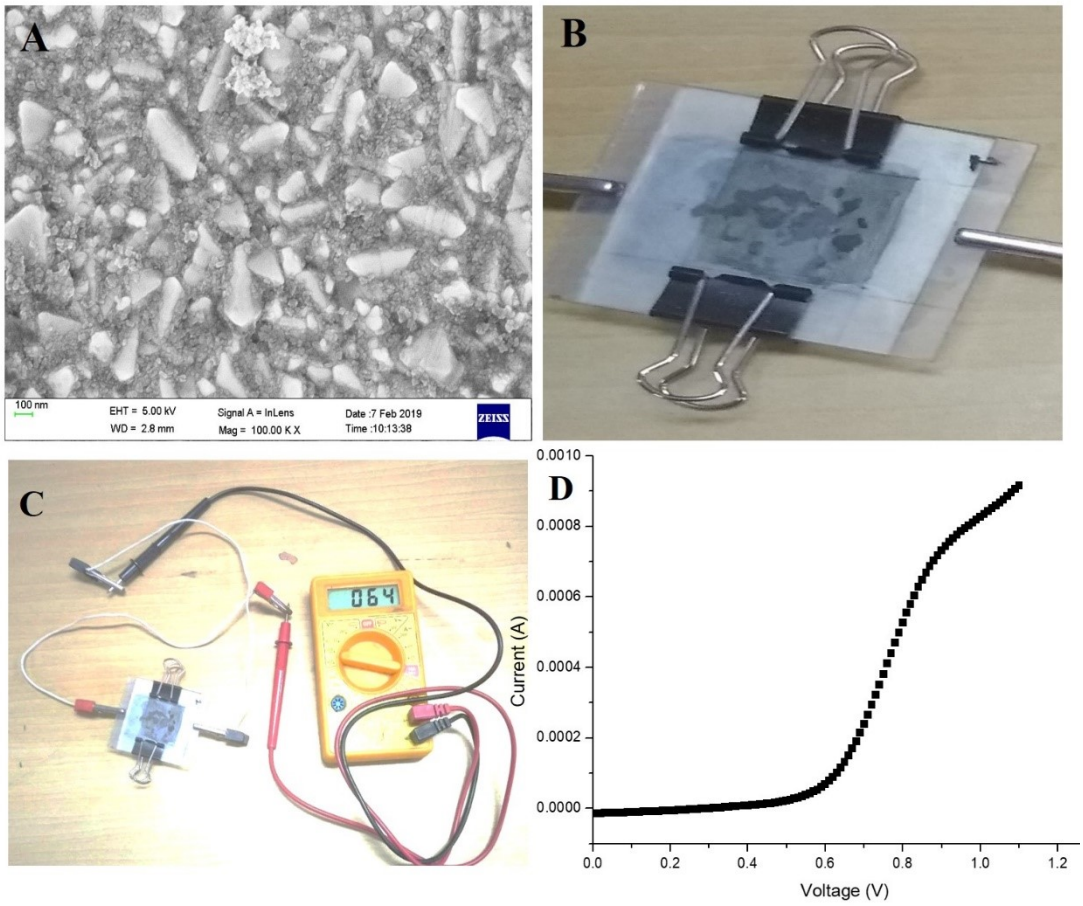
[2]School of Engineering, Department of Biotechnology, Maharishi Markendeshwar University Ambala, Haryana,133203, India

[3]State Forensic Science laboratory, Haryana, Madhuban, 132037, India

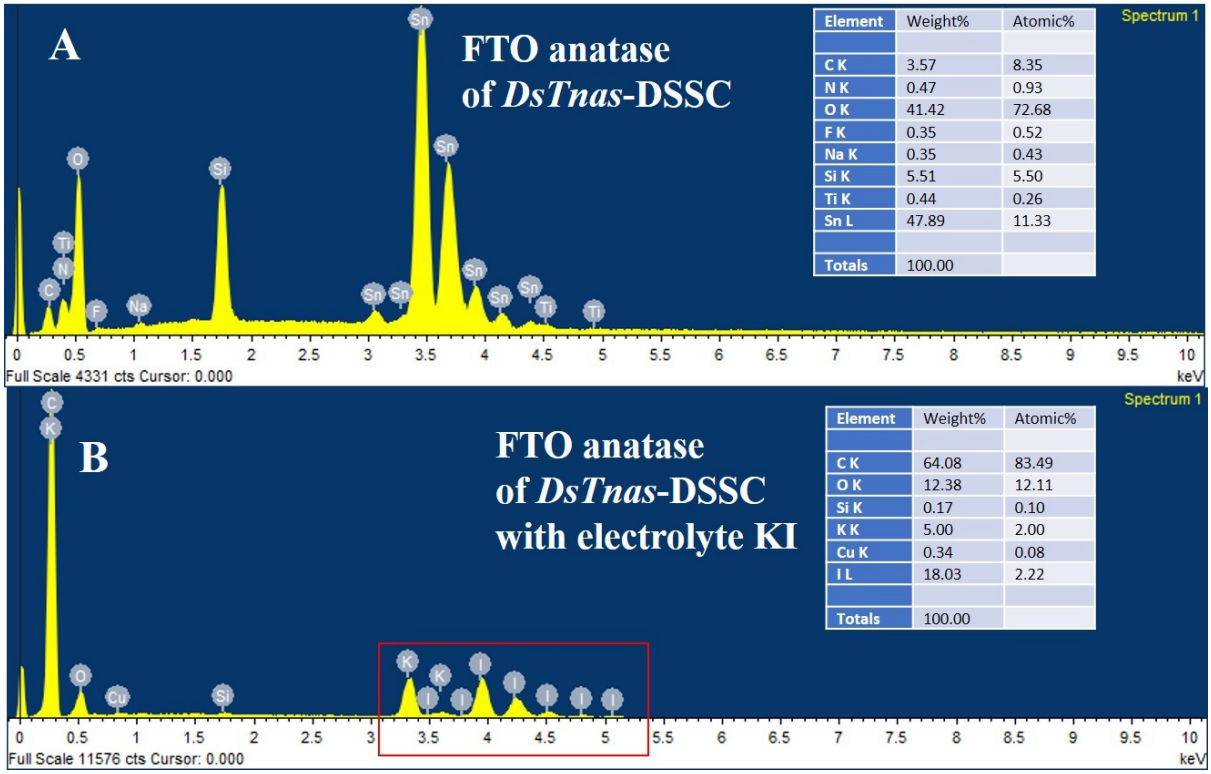
[4]School of Energy and Environment, City University of Hong Kong, Tat Chee Avenue, Kowloon, 999077, Hong Kong

[5]Sustainability Cluster, School of Engineering, University of Petroleum and Energy Studies, Dehradun-248 007, Uttarakhand, India

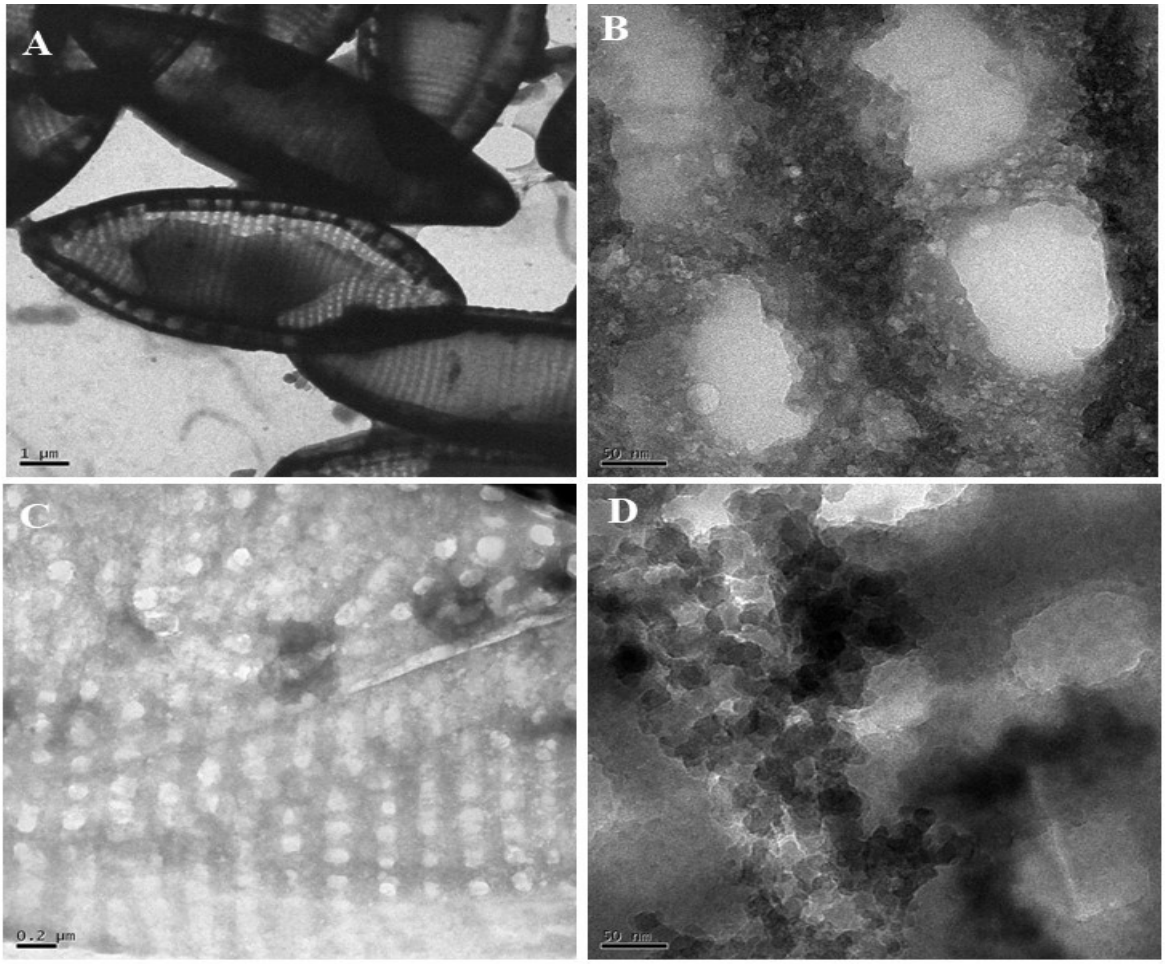
*Corresponding author: kapilvinayak@gmail.com



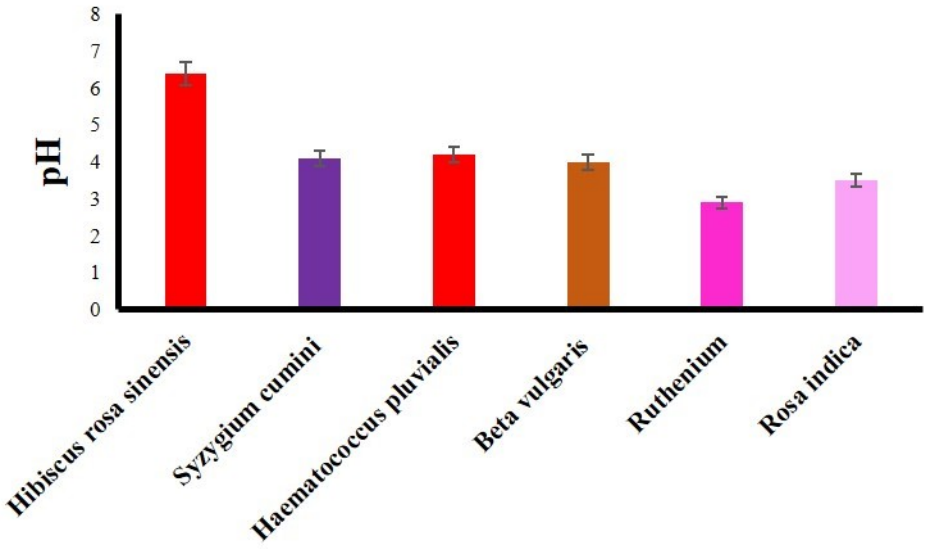
ESI Figure 1. A) Titania anatase rutile coat on FTO anode plate; **B**) Fabricated *DsTnas*-DSSC; **C**) *DsTnas*-DSSC with multimeter set up and **D**) I-V curve of *DsTnas*-DSSC with ruthenium dye as control



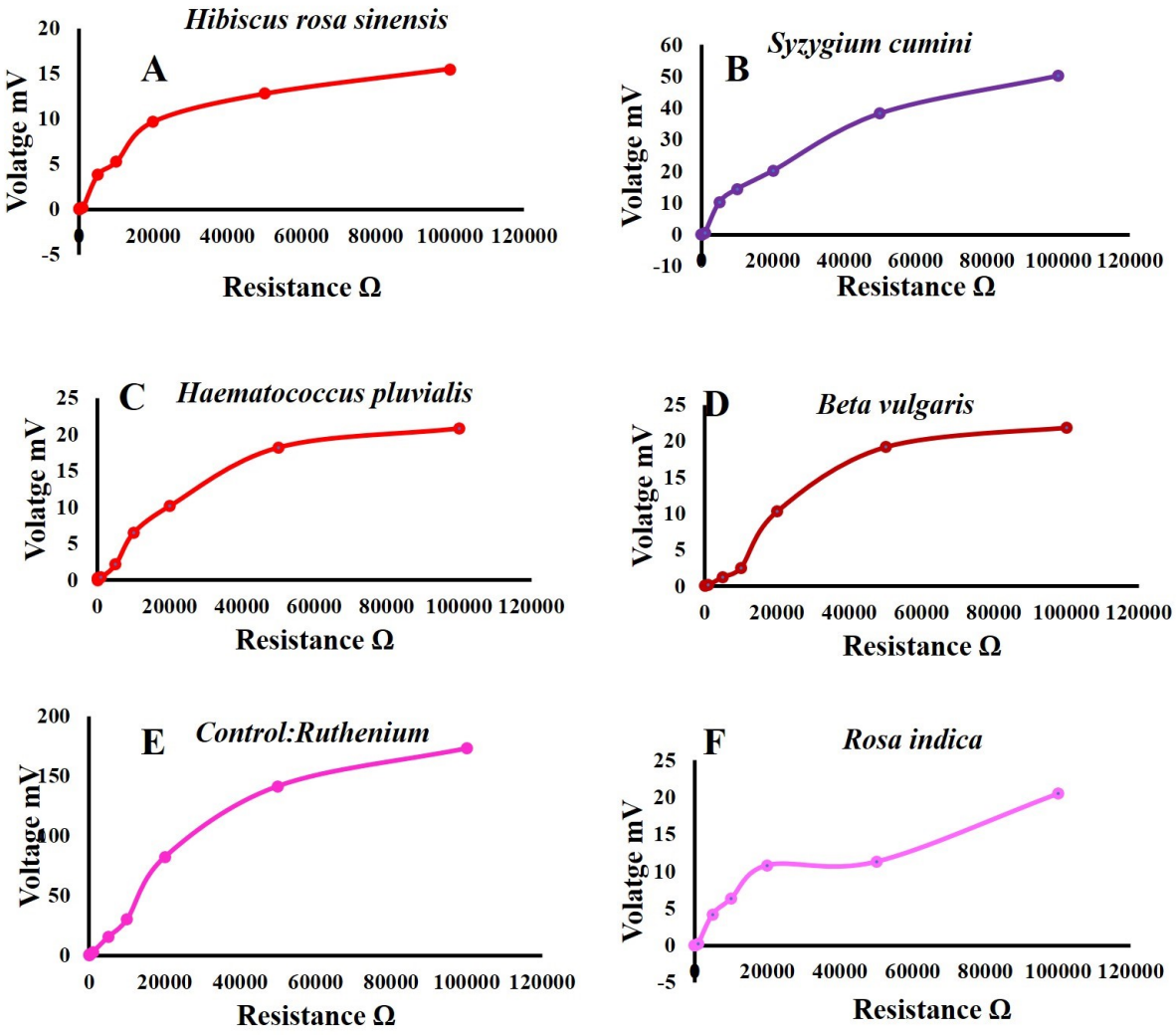
ESI Figure 2 Scanning electron microscopy-energy dispersive X-ray (SEM-EDX) analysis of elemental composition of **A)** FTO anatase of *DsTnas*-DSSC without electrolyte and **B)** FTO anatase of *DsTnas*-DSSC with KI electrolyte (B).



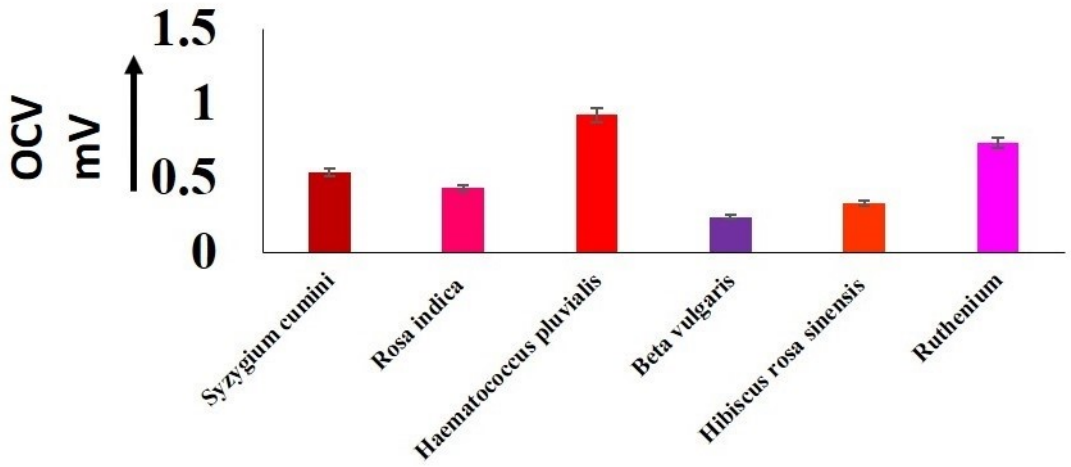
ESI Figure 3. TEM images **A)** Undoped diatom and **B)** Enlarged empty pore structure of diatom frustule; **C)** Diatom rich Si doped with TiO_2 NP and **D)** Enlarged view of TiO_2 NP doped in diatom pore.



ESI Figure 4. pH of different natural dyes **A)** *Hibiscus rosa sinensis* **B)** *Syzygium cumini;* **C)** *Haematococcus pluvialis;* **D)** *Beta vulgaris;* **E)** Ruthenium and **F)** *Rosa indica*



ESI Figure 5. Voltage (mV) obtained in *DsTnas*-DSSCs at resistance 20K to 120K using **A)** Ruthenium; **B)** *Syzygium cumini;* **C)** *Beta vulgaris;* **D)** *Haematococcus pluvialis;* **E)** *Rosa indica* and **F)** *Hibiscus rosa*



ESI Figure 6. Open circuit voltage of *DsTnas*-DSSCs with natural dyes