

**Notification No.:** 524/2022

**Date of Award:** 21/10/2022

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**Name of the Department:** Biosciences

**Topic of Research:** Biosynthesis and Characterization of Titanium Dioxide Nanoparticles Using Cyanobacteria and Evaluation of Its Bioactivity

### **Findings**

In this study, 37 cyanobacterial strains were screened for the synthesis of TiO<sub>2</sub>NP (Titanium Dioxide Nanoparticles). Aqueous extract of all strains was capable of synthesizing TiO<sub>2</sub>NP. Characterization of the biosynthesized TiO<sub>2</sub>NP was done via UV-Vis, XRD, FTIR, TEM, EDX, SEM, AFM and DLS.

Biofabricated TiO<sub>2</sub>NP exhibited dose-dependent free radical scavenging activity as demonstrated by antioxidant assays (DPPH and ABTS). They possessed notable dose-dependent antimicrobial activity revealed by antibacterial and antifungal assays. They were found to be biocompatible as demonstrated by hemolysis of human RBCs. They possessed the capability to reduce inflammation as shown by proteinase inhibition and albumin denaturation activity. They have scope to be used as antidiabetic agents as shown by their potential to inhibit both  $\alpha$ -amylase and  $\alpha$ -glucosidase. They can also act as anticancer drugs as elucidated by MTT and DAPI assay. TiO<sub>2</sub>NP also induced apoptosis visualized by fluorescence microscopy.

Findings of the present study suggest that studied cyanobacterial strains were capable of synthesizing TiO<sub>2</sub>NP in an eco-friendly and quick way. Biosynthesized TiO<sub>2</sub>NP derived from

*Synechocystis* NCCU-370 extract showed promising antioxidant, antifungal and antibacterial, anti-inflammatory, antidiabetic and anticancer activity. Biocompatible nature of our biosynthesized TiO<sub>2</sub>NP further renders them safe for biomedical purposes.