

**Title:** *Nanocellulose Reinforced Biopolymer Based Hydrogel for Drug Loading and Delivery*

**Abstract:**

A poorly water-soluble anticancer drug, curcumin was loaded in to cellulose nanocrystals by dissolving it in nonionic surfactant (Tween 20) medium. Results showed that the drug loading capacity of nanocellulose increased with increasing the Tween 20 concentration of the medium. The drug loading capacity of nanocellulose in Tween 20 medium was significantly higher (7.73 mg/g) when compared to the drug loading capacity (3.35 mg/g) in methanolic medium. The nanocellulose drug loaded in Tween 20 medium (TW/CNC) showed higher drug release compared to the nanocellulose drug loaded in methanolic medium (METH/CNC). It was 8.99 mg/L for TW/CNC and 2.65 mg/L for METH/CNC in simulated gastric fluid. Due to the increased stability of curcumin in acidic medium, all the nanoparticles showed higher drug release in simulated gastric fluid compared to phosphate buffered saline solution. The maximum dissolution of curcumin was 2.13 mg/mL in distilled water containing 4% (w/v) of Tween 20. UV-visible spectra revealed that the curcumin retained its chemical activity after in vitro release. From these findings, it is believed that the incorporation of curcumin into nanocellulose in Tween 20 medium provides a promising approach for delivery of curcumin to stomach and upper intestinal tract.



**Assoc. Prof. Ir. Dr. Ching Yern Chee** has been practicing as a material engineer for the past ten years in polymer industrial. She has obtained her Doctor of Philosophy in Engineering in 2011 from the University of Malaya. Now, she has more than 18 years of experience in the field of Materials Engineering and Polymer Technology in both academia and private industry. She has published more than 80 research articles in various ISI/WoS- and Scopus-listed publications.

Amongst her research achievements include the synthesis and modification of nano-structured materials and biopolymers with enhanced physical, chemical and thermal properties, development of functional nano-materials, and investigation of processes of controlling the self-assembly of nano-structures, with emphasis on thermochemical and thermophysical properties. Assoc. Prof Ir. Dr. Ching has filed numerous intellectual property rights /patents for her inventions and received many accolades as a distinguished scholar. She is filing a few patents, trademarks and copyrights which stem from his specialty research. She has 11 gold awards and 5 Best Invention Awards at international/national exhibitions pertaining to her research and inventions.

Assoc. Prof. Ir. Dr. Ching is a Chartered Engineer with the Engineering Council, UK and a Professional Engineer with the Board of Engineers Malaysia. She is also served as Fellow of 2 prominent professional societies. i.e. The Institution of Mechanical Engineers UK and Institution of Engineers Malaysia