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Authors: Mhd Abd Cader Mhd Haniffa, Yern Chee Ching, Cheng Hock Chuah, Yong Ching Kuan, Nik Nazri, Luqman Chuah Abdullah, Liou Nai-Shang

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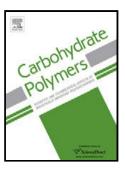
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# ACCEPTED MANUSCRIPT

Effect of TEMPO-Oxidization and Rapid Cooling on Thermo-Structural Properties of Nanocellulose

Mhd Abd Cader Mhd Haniffa<sup>1,2</sup>, Yern Chee Ching<sup>1,\*</sup>, Cheng Hock Chuah<sup>2</sup>, Yong Ching Kuan<sup>3</sup>, Nik Nazri<sup>4</sup>, Luqman Chuah Abdullah<sup>5</sup>, Liou Nai-Shang<sup>6</sup>

- <sup>1</sup>Department of Chemical Engineering, Faculty of Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia
- <sup>2</sup>Department of Chemistry, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia
- <sup>3</sup> University of Reading Malaysia, Persiaran Graduan, Kota Ilmu, Educity, 79200 Iskandar Puteri, Johor, Malaysia
- <sup>4</sup>Department of Mechanical Engineering, Faculty of Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia
- <sup>5</sup> Institutes of Tropical Forestry and Forest Product (INTROP), University Putra Malaysia, Serdang 43400, Malaysia
- <sup>6</sup> Department of Mechanical Engineering, Southern Taiwan University of Science and Technology, Tainan City 710, Taiwan R.O.C.

## Highlight:

- Cellulose nanofibrils (CNFs) were prepared from MCC using TEMPO-oxidation.
- Acid hydrolyzed nanocrystalline celluloses (NCCs) was treated with TEMPOoxidation.
- Thermo-structural properties and thermogravimetric analysis of the nanocellulose were investigated with respect to rapid cooling treatment.
- Rapid cooling treatment improve thermo-structural properties of the nanocelluloses
- TEMPO-oxidation and rapid cooling treatment contributes to the fabrication of NCCs with a high number of carboxyl entities and admirable thermal stability.

#### **Abstract**

Recently, surface functionality and thermal property of the green nanomaterials have received wide attention in numerous applications. In this study, microcrystalline cellulose (MCC) was used to prepare the nanocrystalline celluloses (NCCs) using acid hydrolysis method. The NCCs was treated with TEMPO [(2,2,6,6-tetramethylpiperidin-1-yl)oxy radical]-oxidation to prepare TEMPO-oxidized NCCs. Cellulose nanofibrils (CNFs) also prepared from MCC using TEMPO-oxidation. The effects of rapid cooling and chemical treatments on the thermostructural property studies of the prepared nanocelluloses were investigated through FTIR,

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