**A simple multi-wavelength spectroscopic method for the determination of carboxyl group content in nanocellulose (Times New Roman, 12 font, bold)**

Ning Yan 1, Xin-Sheng Chai 2, Troy Runge 3\*(Times New Roman, 10.5 font)

1 College of Bioresources Chemical and Materials Engineering, Shaanxi University of Science & Technology, Xi’an, China

2 State Key Laboratory of Pulp and Paper Engineering, South China University of Technology, Guangzhou, China

3 Department of Biological System Engineering, University of Wisconsin-Madison, Wisconsin, US

\* Corresponding author’s e-mail address: [trunge@wisc.edu](mailto:trunge@wisc.edu)

*(NOTES: Please replace the above title, author names, affiliations, and corresponding author’s e- mail address with yours. Presenter’s name should be underlined. Please delete these lines in red letters when you will have completed to prepare your abstract.)*

# ABSTRACT (Times New Roman, 10.5 font, bold): This study describes a multi-wavelength spectroscopic method for the determination of carboxyl group content of nanocellulose. Methylene blue (MB) was used as a color indicator, which can bind to the carboxyl groups in nanocellulose to form a R-COOMB complex with a binding ratio of 1:1, although the spectrums of MB and R-COOMB at 500 ~ 750 nm are overlapped, and solid impurities could cause spectral interference. To solve these issues, a multi-wavelength spectroscopic measurement on a MB and nanocellulose mixture solution technique and mathematical model were developed, allowing the content of carboxyl groups in nanocellulose to be quantified. The results showed that the method has good measurement precision and accuracy as compared with those measured by a reference method. The method is simple and requires only a small sample size for testing and thus makes it suitable for nanocellulose related research and applications. (Times New Roman, 10.5 font)

# KEYWORDS (Times New Roman, 10.5 font, bold): Nanocellulose; Carboxyl group; Methylene blue; Multi-wavelength spectroscopy (Times New Roman, 10.5 font)

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