

Nanocellulose as an Additive in the Pulp and Paper Industry

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The rising demand for sustainable and high-performance materials in the pulp and paper industry has spotlighted nanocellulose (NC) as a promising additive. Derived from natural cellulose, NC offers exceptional properties such as high mechanical strength, biodegradability, and a large surface area, making it a versatile and eco-friendly option for paper enhancement. This abstract presents an overview of NC's role as an additive in papermaking, focusing on its production processes, including the mechanical and chemical methods used to obtain cellulose nanofibers and nanocrystals. The integration of NC into paper products leads to significant improvements in tensile and burst strength, barrier properties, and overall durability. Additionally, NC enhances the surface quality of paper, making it suitable for advanced applications such as packaging, specialty papers, and nanofilms. The potential of NC to reduce environmental impact, improve the recyclability of paper, and create innovative products is also highlighted. Challenges in large-scale production, cost considerations, and the future outlook of NC in the paper industry are discussed, underscoring its role in driving the transition towards more sustainable and high-performance paper products.

Biography:

R.A. Ilyas is a senior lecturer in the Faculty of Chemical and Energy Engineering, Universiti Teknologi Malaysia, Malaysia. He is also a Fellow of International Association of Advanced Materials (IAAM), Sweden, Fellow of International Society for Development and Sustainability (ISDS), Japan, a member of Royal Society of Chemistry, UK and Institute of Chemical Engineers (IChemE), UK, Chair of Science Outreach for Young Scientists Network-Academy of Sciences Malaysia (YSN-ASM) 2023. He received his Diploma in Forestry, Bachelor's Degree (BSc) in Chemical Engineering, and Ph.D. degree in the field of Biocomposite Technology & Design at Universiti Putra Malaysia, Malaysia. R.A. Ilyas was the recipient of the MVP Doctor of Philosophy Gold Medal Award UPM 2019, for Best Ph.D. Thesis and Top Student Award, INTROP, UPM. He was awarded with Outstanding Reviewer by Carbohydrate Polymers, Elsevier United Kingdom, Top Cited Article 2020-2021 Journal Polymer Composite, Wiley, 2022, and Best Paper Award at various International Conferences. R.A. Ilyas also was listed and awarded among World's Top 2% Scientist (Career-Long Achievement) Year 2022, World's Top 2% Scientist (Subject-Wise) Citation Impact during the Single Calendar Year 2019-2022 by Stanford University, US, PERINTIS Publication Award 2021 and 2022 by Persatuan Saintis Muslim Malaysia, Emerging Scholar Award by Automotive and Autonomous Systems 2021, Belgium, Young Scientists Network-Academy of Sciences Malaysia (YSN-ASM) 2021, UTM Young Research Award 2021, UTM Publication Award 2021&2023, and UTM Highly Cited Researcher Award 2021. In 2021, he won Gold Award and Special Award (Kreso Glavac (The Republic of Croatia) at the Malaysia Technology Expo (MTE2022), Gold Award dan Special Award at International Borneo Innovation, Exhibition & Competition 2022 (IBIEC2022), and, a Gold Award at New Academia Learning Innovation (NALI2022). He was awarded with Best Scientific Book Award from COMSTECH, Organization of Islamic Cooperation (OIC), Pakistan and ModTech, Romania. His main research interests are (1) Polymer Engineering (Biodegradable Polymers, Biopolymers, Polymer composites, Polymer-gels) and (2) Material Engineering (Natural fiber reinforced polymer composites, Biocomposites, Cellulose materials, Nano-composites). To date he has authored or co-authored more than 600 publications on green materials related subjects.