

Chemical Engineering: From Materials Engineering to Nanotechnology

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Bioactive polymers and composite materials for use in medical and food packaging applications

Plastics from fossil-based chemicals are used for almost all of medical and food packaging application and to minimize spoilage, additional preservative is enclosed therein. To minimize food loss for instance during packaging as a result of bacterial or fungal activity, we synthesized plastics from starch-based sources (bioplastics). These polymers were reacted in-situ with anti-microbial active colorant from both synthetic and natural sources. The resultant bioplastic materials were found to have improved resistance to microbial activity. There is an increasing use of fossil-based chemicals for the production of polymers and with the ever-increasing use of synthetic polymers in materials application, the dependence on fossil-based sources which leads to environmental pollution is ever increasing. The rising concerns about the use of fossil-based chemicals have led to searches for alternative source. Sustainability or long-term viability, and the need to avoid the adverse environmental consequences of fossil-based resources have been very key in the search for design and production of polymers from renewable sources that have the needed performance properties and limited carbon dioxide (VOC's) emissions. However, such biopolymers can be susceptible to lipid oxidation and microbial growth, the main cause of spoilage of a great variety of nutritional foods and product integrity. In

order to reduce our dependence on fossil fuel, environmental impact as result of pollution and waste management and to minimize food loss during packaging, we synthesized several bioplastics from starch-based sources. By integrating these innovative and sustainable interdisciplinary scientific approaches, the research will advance the understanding of the field of biopolymers and composite materials in the design and development of films and plastics for use in the emerging field of "active" food packaging and biomedical technology.

Speaker Biography

Dr. Ibrahim Katampe, an Associate Professor of Chemistry is currently the chair of the department of Natural Sciences at Central State University. He is published in several academic journals and is an inventor with over 6 patents. Dr. Katampe earned his PhD in 2000 from Open University, Milton Keynes, United Kingdom where he was investigating on synthesis and reactions of silyl-heterocyclic compounds. Dr. Katampe is an active member of both the University and the Dayton community; he is a member of the board of trustees of the Dayton Area Chamber of Commerce, board of trustees of the Montgomery County Workforce Development and Investment Board. He is a recipient of several awards including the prestigious Planet Africa Science and Technology Award by the planet Africa Group, Canada and also the SOIN award for Technology Innovation by the Montgomery County, Ohio, USDA capacity building grant. Professor Katampe's research interests include: Biopolymer and composite material synthesis, biosensor development, renewable and bio energy crops.

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