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# MATERIALS SCIENCE AND ENGINEERING

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## Nanocellulose: The next generation of super materials

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Cellulose is one of the most abundant natural resources on this earth and it is one of the most important structural components of the primary cell wall of green plants, many forms of algae and the oomycetes. Cellulose history dates back to as early as the 1860s when the first rayon fibers were commercialized by Courtaulds. Although cellulose has a long history in the commercial market, its incompatibility with most polymer matrices, tedious extraction processing and large amounts of energy and time needed to extract and convert to nano cellulose form has lessened its attractiveness for use in the design of bio-based materials. That being said, our group research has focused on the extraction and modification of micro- and nano cellulose and its dispersion into biodegradable and non-biodegradable polymer matrices to form bio-based plastic materials. This presentation will report on our investigation of the influence of cellulose micro fibrils and nano fibrils, CMFs and CNFs, respectively, dispersion on the thermal, mechanical and biodegradable properties of polymeric composites. In summary, our research has observed an increase in the thermal stability of modified CMFs and CNFs when compared to their unmodified cellulose counterparts. Dynamic mechanical analysis(DMA), thermal mechanical analysis (TMA), show marked improvements in the mechanical properties of the cellulose-based composites when compared back to its neat counterpart.

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