



Council for Scientific and Industrial Research (CSIR)

Natural Resources and the Environment (NRE)

Durban, South Africa

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| Title: | Production of nano-crystalline cellulose (NCC) from sawdust waste material |
| Abstract: | <p>The objective of the project is to beneficiate sawdust waste from various wood processing operations, but primarily from sawmills. South Africa has over 500 sawmills of varying capacities countrywide, both formal and informal. According to local sawmilling companies, only 40% of a tree is utilised, with the remaining 60% discarded as waste products in the form of sawdust, chips, offcuts and shavings. Within the context of a biorefinery, the aim of this project is to produce nano-crystalline cellulose (NCC) from the sawdust waste with the intention to incorporate the NCC into the fabrication of bio-composite materials. Sawdust is composed primarily of cellulose, lignin and hemicellulose. Nano-crystalline cellulose is produced from cellulose. They are rigid, defect free, monocrystalline structures that are typically 50-600 nm long and 2-20 nm. They differ from the bulk cellulose material from which they were prepared due to significant differences in surface charge, surface area, surface energy, crystalline structure and dimensions, and because of this, offer promising opportunities for application in several areas such as construction, automotive, medical, and environmental. Because of their high mechanical strengths that are comparable with stainless steel and Kevlar, NCC also has the potential to serve as the reinforcing or load bearing component in composite materials.</p> |
| Lead institution: | CSIR |
| Partner institutions: | UKZN, McGill University |
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| Principal Investigator | Prof. Bruce Sithole |
| Degree: | PhD |
| Funded by: | CSIR, DST Waste Roadmap |
| Start date: | Jan 2016 |
| End date: | March 2018 |
| Feedstock: | Sawdust |
| Value chain products: | Nano-crystalline cellulose |
| Geographic source of the feedstock: | Across South Africa |