

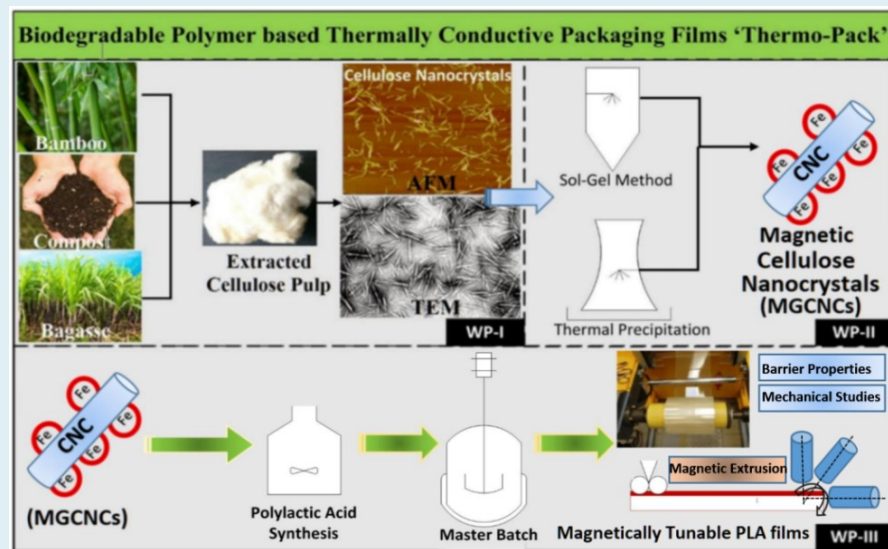
## Thermally Conductive Packaging Films: Thermo-Pack

### Salient features

- Poly Lactic Acid / Magnetic Cellulose Nanocrystals (PLA/MGCNC) based biodegradable polymer with hyperthermia characteristics for improved self-life for stored food items
- Cellulose Nanocrystals (CNC) based thermally conductive biopolymer food packaging films with necessary gas barrier, mechanical and thermal properties.
- Fabrication of cellulose nanocrystals (CNCs) from renewable biomass resources such as bamboo trees, composts etc.
- Increase in temperature of films by  $\sim 20^{\circ}\text{C}$  under alternating magnetic field. Because of such noteworthy property this packages are called “Thermo-Pack”.

### Advantages

- ✓ Use of bioplastics and bio-derived polymers based on renewable agricultural and biomass feedstock
- ✓ Potential to substitute conventional polymers at industrial scale to reduce carbon foot print and improve ecological balance
- ✓ Preservation of foods while packaging



### Process Technology developed by

Dr. Vimal Katiyar, Department of Chemical Engineering  
Indian Institute of Technology (IIT), Guwahati-781039, Assam  
Email: [vkatiyar@iitg.ernet.in](mailto:vkatiyar@iitg.ernet.in), [vkatiyar@iitg.ac.in](mailto:vkatiyar@iitg.ac.in)

### Year

2015-16

<i>Source of funding</i>	MoFPI
<i>More information</i>	<p><b>Status of commercialization / Patent / Publication</b></p> <p>Dhar, P., Kumar, A. and Katiyar, V. 2015. Fabrication of cellulose nanocrystal supported stable Fe (0) nanoparticles: a sustainable catalyst for dye reduction, organic conversion and chemomagnetic propulsion. <i>Cellulose</i>, 22(6): 3755-3771.</p> <p>Dhar, P., Kumar, A. and Katiyar, V. 2016. Magnetic cellulose nanocrystal based anisotropic polylactic acid nanocomposite films: influence on electrical, magnetic, thermal, and mechanical properties. <i>ACS Applied Materials &amp; Interfaces</i>, 8(28): 18393-18409.</p> <p>Dhar, P., Narendren, S., Gaur, S.S., Sharma, S., Kumar, A. and Katiyar, V. 2020. Self-propelled cellulose nanocrystal based catalytic nanomotors for targeted hyperthermia and pollutant remediation applications. <i>International Journal of Biological Macromolecules</i>, 158: 1020-1036.</p> <p>Alishahi, K., Marvasti, F., Aref, V.A. and Pad, P. 2008. Generalized Welch bound equality sequences are tight frames. <i>IEEE Transactions on Information Theory</i>, 49(9): 2307-2309.</p> <p><b>Patent</b></p> <p>Alishahi, K., Marvasti, F., Aref, V.A. and Pad, P. 2008. Particle trap for compressed gas insulated transmission systems, US Patent No. 4554399.</p>