Networking and Brokerage Event

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Sustainable Advanced Materials

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Biobased Polyurethanes and Nanocomposites for Functional Applications

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EXPERTISE OFFER FOR International COLLABORATION ON APPLICATION Development.

The expertise of my team is highlighted below:

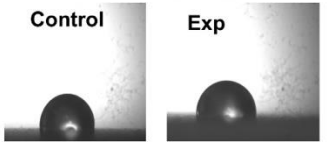
Safe and Sustainable by Design- SSbD

Cardanol Polyol Modified Aqueous PolyUrethane Dispersions (WPUD)

- Aqueous biobased Polyurethane dispersions are speciality chemicals required in a number of applications like coatings for textiles, wood, metals, leather etc. The cardanol polyol modified PU dispersions offer unique properties compared to the widely used polyester and polyether polyols or castor based polyols. The MSTD group CSIR-NIIST has developed technology to make cardanol polyol modified aqueous PUD.
- Samples validated by CSIR-CLRI and industry validation in progress.
- Indian Patent application No. 202411050873 Dt. 3rd July 2024.

water contact angle

Control	Experiment
94.65 ± 1.15°	99.59 ± 2.86°



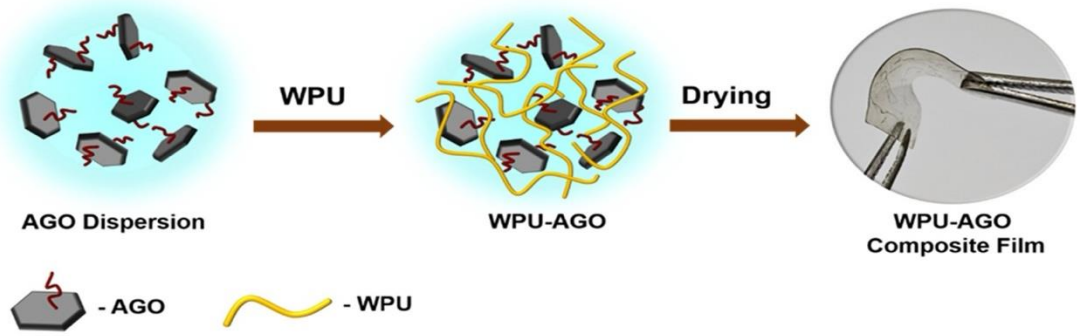
Improved hydrophobicity (water contact angle) of finished leather sample as compared to standard (control).

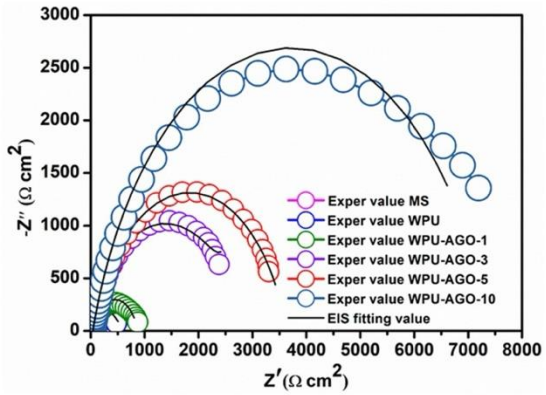
Project Code-MLP 0078 **CSIR-FTT CHEMICAL THEME**

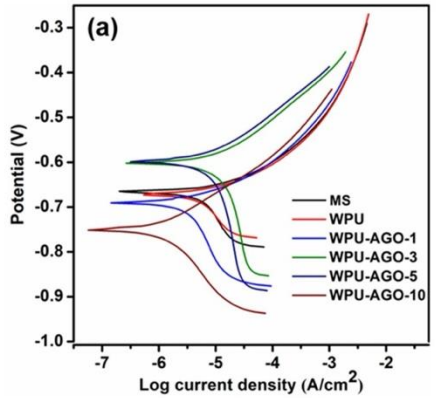
Devikrishna K.S. ; Suresh K.I.(2025) ACS - Applied Polymer materials
https://doi.org/10.1021/acsapm.5c02116

Amphiphilic Graphene –WPUD nanocomposites for Coatings

- **Bioderived fluorescent waterborne polyurethane dispersions (WPUDs) have gained greater prominence in the coating industry as they reduce the volatile organic compounds (VOCs) and HAPs released by solvent-borne coatings.**
- **WPUD-functionalized graphene nanocomposites is important to improve the anti-corrosive characteristics of the PUD coatings.**



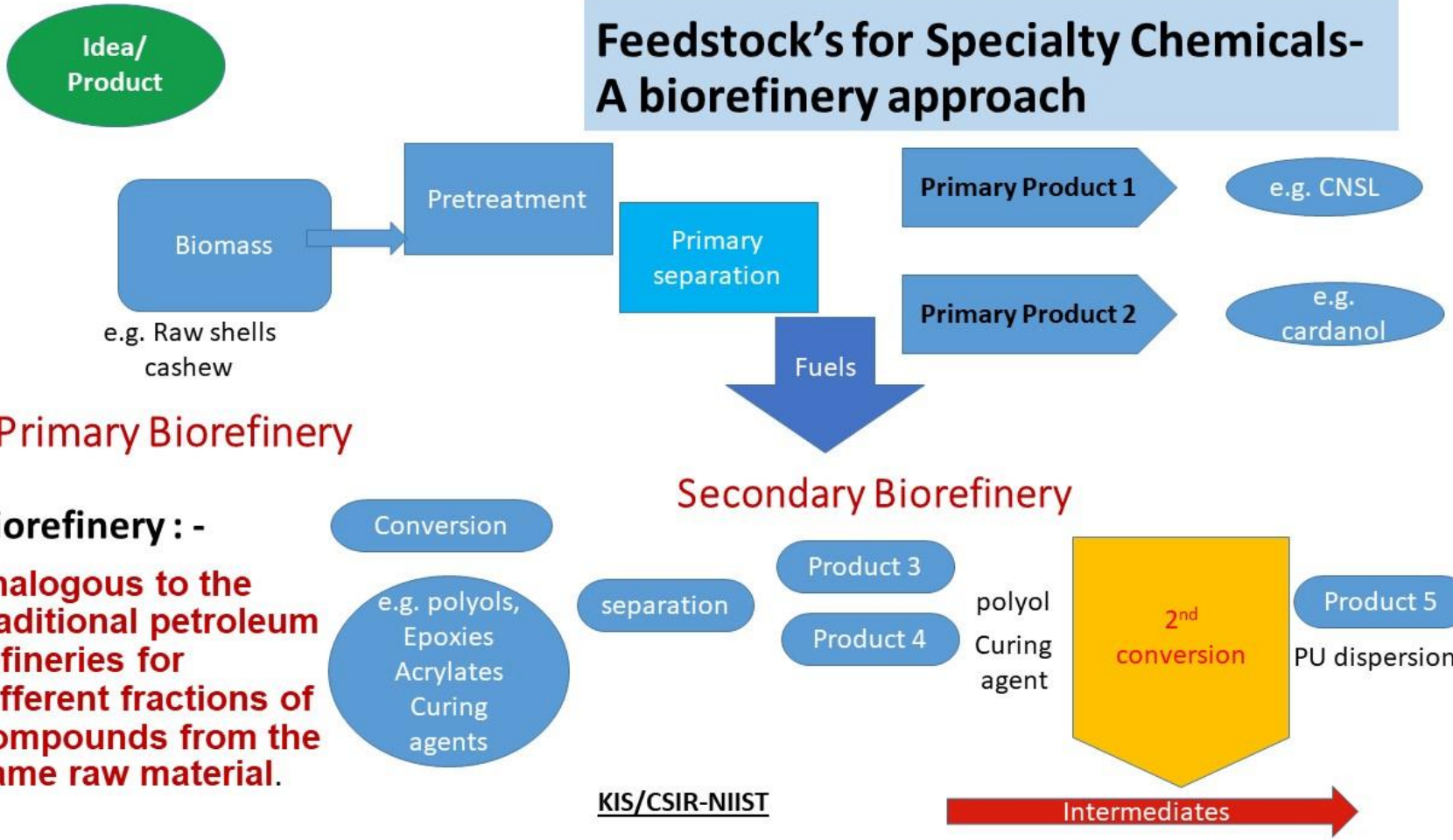




Devikrishna K.S. ; Suresh K.I. J. Mater. Sci. (2025), https://doi.org/10.1007/s10853-025-10621-2.

Safe and Sustainable by Design- SSbD

Feedstock's for Specialty Chemicals- A biorefinery approach



SUMMARY

Progress in sustainable Chemistry/Green Chemistry during the last 2-3 decade has resulted in new directions in advanced materials research.

- Sustainable advanced Materials are required in a number of applications ranging from structural adhesives, coatings for correction protection, Barrier coatings in packaging , leather processing etc..
- My team at CSIR-NIIST has developed sustainable leather coatings, graphene polymer nanocomposites using biobased polymers and various carbon nanomaterials as illustrated some case studies.

1. Polymeric surfactants and high strength adhesives.
2. Cardanol Polyol Modified PU dispersions, polyurethane foams etc.
3. Structure – property correlation studies of graphene – nanocomposites.
4. Anticounterfeiting inks using cellulose derived carbon dots
5. Selective sensors for mercury detection using doped carbon dots.

Thank you for your attention