



SCO-Young Scientist Profile

First Name: Sathish

Last Name: Murali

Designation & affiliation: Scientist, CSIR-Central
Leather Research Institute, Regional Central for
Extension and Development, Kolkata

Phone Number: +91 9952981456/+91 8610696614

E-mail: sathish@clri.res.in; sathishmclri@gmail.com



Details of research work carried out in S&T (*limit to 200 words*)

I have been working as an interdisciplinary scientist at CSIR-Central Leather Research Institute. The area of interest includes designing of various strategies for reducing water /bulk chemical consumption in leather manufacturing. In addition, implementation of circular economy model and development of eco-benign leather auxiliaries are the major focus. I have critically analyzed and reviewed various possibilities of exploring alternative carrier medium to water like green solvent, supercritical fluid and switchable solvent for sustainable leather manufacturing. For the first time a solvent selection tool based on GSK's solvent selection guide has been developed and that enables selection of green solvents for leather manufacturing. I have established a water-free leather manufacturing technique using alternative green solvent which ensure zero discharge of tanning salt like chromium and process liquor. The strategies employed for the development of waterless leather manufacturing process and the solvent selection methodologies can be implemented for other natural fiber processing industries. I have developed a path-breaking "Preservation-cum-Unhairing" technology which eliminates the salt and toxic sodium sulfide in leather making. The technology was highly appreciated by the leather fraternity and commercialization of the same is under the pipeline. I have also developed leather auxiliaries from leather industry solid waste as a model for a circular economy. Currently, developing an "Environmental Efficiency Index Model by using multi-criteria assessment tool" as a common language for leather manufacturing and the model can be applied for other manufacturing sectors.

Associated SCO-YSC Theme: Environment Protection and Natural Resource Management

Statement of Innovation (*Brief information on new innovative ideas including startup / entrepreneurs- limit to 150 words*)

Natural fiber processing industries such as leather and textile consume copious amount of water and also discharge wastewater with high pollution load. Besides, leather/textile manufacturing involves series of unit processes and consumes several chemicals. The pollution load emanating from the manufacturing sectors affect the water bodies, soil etc. Therefore, designing of strategies and development of “Solvent-cum-Reagent” model for fiber processing would avoid the discharge of wastewater with high pollution load. The main focus of the present idea is to use a formulation that acts as a solvent for water-free fiber processing and subsequently the used solvent can be turned into a reagent to improve the functional properties of fiber matrix. Therefore, the consumption of water and bulk chemicals quantity will be greatly reduced.

Major awards/ Achievements (*Upto 3 awards*)

1. INAE Young Engineer Award - 2020
2. CSIR-Technology Award (Physical Science including Engineering) – 2020
3. Sujatha Venkateswara Rao Excellence Award for Technologists-2020

Possible collaboration with SCO countries (*limit to 100 words*)

Based on the intensive research work and the experience gained for the past nine years, it can be concluded that the cyclic carbonate solvents are potential alternative to water in leather manufacturing. It is also reported that the cyclic carbonate solvents are used as precursor for synthesis of various organic polymers. Besides, it is also found that the scope for utilizing switchable solvent in leather making is wider. Hence, the it is expected to collaborate with the SCO countries in the following research area

1. Development of water soluble polymeric materials using cyclic carbonates as precursor
2. Exploration of switchable solvents in leather manufacturing

Key words (*relevant to research work conducted as well as proposed innovation, 5-6 words*)

Leather; Water-Free; Solvent-cum-Reagent; Cyclic Carbonates; Switchable Solvents