Isohexide dioxalates: Renewable building blocks for degradable polyoxalates

EXECUTIVE SUMMARY

CSIR-NCL scientists have invented novel and renewable monomers for making hydrolytically degradable polyoxalate resins and transparent films/sheets. CSIR- NCL has filed patents for the novel monomers, the process of making them from sugar-based starting materials and the resulting polymers. The invention is now available for licensing/ co-development.

BACKGROUND

- Polyoxalates are used in biomedical and drug delivery applications. They are preferred in applications that require biocompatibility, biodegradability and rapid hydrolytic degradation
- Polyoxalates can potentially be used for specialty transparent packaging with the additional benefit of post-use degradation

TECHNOLOGY DESCRIPTION

- CSIR-NCL scientists (led by Dr. Samir Chikkali) have invented a novel, patent-pending, isohexide dioxalates (IDs) by using a one-step synthetic process from sugar based starting materials
- The scientists have also demonstrated an efficient process for the conversion of IDs to a stable polymer. The polymers were of sufficiently high MW to be cast into stable transparent films with high mechanical strength

Polyoxalate film showing transparency

MARKET POTENTIAL

- The Global Bio-Based Polymers market size is expected to reach $ 9.6 billion by 2025 (6.6 % CAGR)[1]

VALUE PROPOSITION

- Starting material is a commonly available sugar derivative
- One step synthetic protocol for renewable isohexide-dioxalates
- Produces high MW and narrow polydispersity. Polymers could be cast into transparent, mechanically robust films
- Patent pending

APPLICATIONS

- **Polyoxalates**- Biomedical applications, drug delivery, advanced packaging
- **Isohexides dioxalates**-Building blocks for organic transformations

TECHNOLOGY STATUS

- Process technology demonstrated and validated at lab level
- Patents covering composition, process of synthesis of monomer and polymer are covered on patent pending for approval (WO2019012560)
- Technology and patents are available for licensing/Co-development

REFERENCES

1. https://www.researchandmarkets.com/reports/4837061/global-bio-based-polymer-market-2019-2025
2. More information is available in publications in J. Polym. Sci A (2018) DOI: 10.1002/pola.29043

CSIR-National Chemical Laboratory, Pune, India

Case Manager: **Mangesh Vetal|+91-20-2590-2981|md.vetal@ncl.res.in**