

Degradable polyacetals from renewable monomers

EXECUTIVE SUMMARY

CSIR-NCL has invented novel & renewable monomers for manufacturing hydrolytically degradable polyacetal resins & fibers that are amenable to chemical recycling. CSIR-NCL has filed patents for the novel monomers, the process of making them from sugar-based starting materials & the resulting polymers. The invention is now available for licensing/ co-development.

BACKGROUND

- Polyacetals (polyoxymethylene or Delrin) find usage in a variety of engineering applications involving replacements for metals
- There is increasing interest in the industry to a) identify renewable monomers (to reduce dependence on fossil fuels) & b) increase recycling of the polymer (to reduce the volume reaching landfills and increase life-time in use). Chemical recycling of polymers is an attractive method of recycling where one can avoid reduction in polymer quality

TECHNOLOGY DESCRIPTION

- CSIR-NCL scientists (led by Dr. Samir Chikkali) have invented a novel, patent-protected, isohexide diacetals (IDs) by using a one-step synthetic process from sugar based starting materials
- IDs are chiral molecules that can be building blocks for making polyacetals & other organic intermediates
- The scientists have also demonstrated an efficient process for conversion of IDs to a stable polymer without the need for high temperatures conditions or formation of dark, tar-like polymers with lower molecular weights. The synthesized polyacetals were spun into fibers with high mechanical strength

MARKET POTENTIAL

- The global polyacetal resin market is expected to grow from 5.84 to 9.95 USD billion (2018-2025) at a CAGR of 7.9 %¹

VALUE PROPOSITION

- One step synthetic protocol for isohexide-diacetals
- Raw material used is renewable
- Efficient process for the critical challenge of isohexides to stable polymer conversion
- Developed polyacetals are degraded under acidic conditions

APPLICATIONS

- **Polyacetals**- Engineering applications replacing metals/medical applications
- **Isohexides diacetals** -Building blocks for pharmaceutical

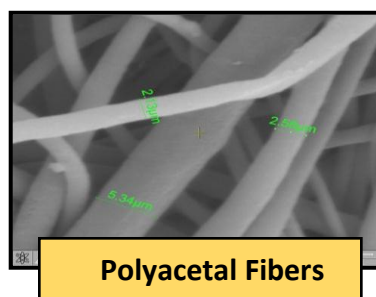
TECHNOLOGY STATUS

- Process technology demonstrated & validated at lab level
- Technology & patents are available for licensing/co-development
- **Patents granted:** [US9815934](#), [EP2994494](#) (GB, DE, FR)

REFERENCES

1. <https://www.globenewswire.com/news-release/2019/07/17/1884019/0/en/Global-Polyacetal-Resin-Market-Will-Reach-USD-9-95-Billion-By-2025-Zion-Market-Research.html>

More information is available in publications in green chemistry (2014) DOI: 10.1039/c4gc00543k



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