

# Lignin based materials with intrinsic recyclability

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Propositions belonging to this thesis:

## **Lignin based materials with intrinsic recyclability**

By Jian Liu

1. Lignin-based materials offer a sustainable alternative to petroleum-derived plastics by utilizing renewable biomass sources.
2. The intrinsic recyclability of lignin-based materials contributes to a circular economy by facilitating efficient material reuse and reducing waste.
3. CANs offer a promising approach to designing high-performance, sustainable materials that can be fully recycled through reversible chemical reactions.
4. Lignin-based materials with dynamic bonds can be reprocessed into new forms, enabling multiple reuse cycles without degradation in material quality.
5. The incorporation of dynamic bonds in lignin-based materials enables self-healing properties, which can improve the longevity of the materials.
6. The integration of lignin-based materials into construction materials can lead to more sustainable infrastructure with reduced environmental impact.
7. Lignin's complex structure provides unique functional properties, which can be tailored to design advanced materials with specific characteristics.
8. The solubility of macromolecular lignin remains a significant challenge in the preparation of lignin-based materials.
9. Although dynamic bonds can enhance the recyclability of lignin-based materials, the high temperature and pressure involved in the recycling process may lead to deterioration.