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Crosslinking of agar by diisocyanates

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Highlights

- Agar based bioplastic is prepared by chemical crosslinking with diisocyanates
- Efficacy of DDI (4, 4 diphenyl diisocyanate) and HDI (1, 6 hexamethylene diisocyanate) is compared on agar crosslinking
- Crosslinked agar films show improved tensile strength and water resistance
- Crosslinked films are non-toxic to blood and show cell proliferation

Abstract

In the present study, crosslinking of agar using diisocyanate (DI) was demonstrated to limit the high water absorption property of agar. In addition, the efficacy of aromatic diisocyanate, DDI (4, 4 diphenyl diisocyanate) and aliphatic diisocyanate, HDI (1, 6 hexamethylene diisocyanate) on crosslinked agar properties was compared. The water uptake was successfully reduced by crosslinking and its minimum values observed for DDI and HDI crosslinked agar was 33.6% and 43.6%, respectively in comparison to agar (206%). The maximum tensile strength was observed for DDI crosslinked agar (45.3 MPa) which was higher than HDI crosslinked agar (30.6 MPa) and agar (31.7 MPa). The aromatic diisocyanates crosslinked agar showed better thermal resistance at higher temperature. It was observed that aromatic diisocyanate crosslinked agar more effectively than the aliphatic diisocyanate due to the higher reactivity.

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