

ONE-POT AND SOLVENT-FREE SYNTHESIS OF CARBODIIMIDE MODIFIED CHITOSAN; EXTRAORDINARY THERMAL STABILITY

Silvadas Jesna Das, Mohan Sidharth, Chandroth Kalyad Simi *

*Post Graduate & Research Department of Chemistry, Mahatma Gandhi College,
Kesavadasapuram, Trivandrum 695 004, Kerala, India
e-mail: cksimi@gmail.com

Abstract. A facile, one-pot, and solvent-free synthesis is demonstrated to obtain a thermally stable chitosan biopolymer. In this work, a bifunctional isocyanate molecule is reacted with chitosan to form urea and urethane bonds between chitosan chains. Subsequently, the designed chemistry facilitated the formation of carbodiimide bonds between chitosan chains via dehydration of the urea bond. The modified chitosan is superior in thermal properties with $T_{10\%} > 400^{\circ}\text{C}$ and char yield of 65%. The modified chitosan can be used as a thermally stable bio-filler. This synthetic methodology is a facile route to achieve improved thermal stability in biopolymers.

Keywords: chitosan, one-pot synthesis, carbodiimide, porous morphology, thermal stability.

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