

Synthesis and characterizations of bio-based polyamide derived from 1,10-diaminodecane and itaconic acid

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A fully bio-based polyamide was synthesized from 1,10-diaminodecane and itaconic acid by melt polycondensation, and the structure, thermal, mechanical properties of the polymer were characterized. <sup>1</sup>H-NMR and FT-IR analysis revealed that this polyamide has a rigid N-substituted pyrrolidone ring in its structure. DMA analysis showed that this polymer showed persistent rubbery plateau, implying that this polymer forms physically crosslinked structure. Further, it was also observed that glass transition temperature(T<sub>g</sub>) of this polymer decreased from 45°C to 14°C upon exposure at 60% RH for 7 days due to plasticization effect of water molecule absorbed into the polymer and the polyamide film become elastic. This feature render the polyamide to exhibit moisture triggered shape memory effect. Moreover, the properties of this polyamide can fully restored when it is heated at temperature above 180°C for 3min.