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Method

Immobilization of deep eutectic solvent in electrospun polyurethane nanofibers for application in the separation of rare earth elements

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ABSTRACT

lactic acid (LA) in a 1:2 mol proportion, was successfully immobilized on the PU nanofibers by electrospinning. After optimizing the electrospinning machine parameters, the fibers were made of PU with 10, 20, and 30 wt.% DES. All DES-PU nanofibers exhibited stability without any significant swelling or loss of materials during equilibrations. The extraction data of La, Ce, Nd and Eu in TOPO-LA DES loaded nanofibers as a function of HNO_3 concentration exhibited faster kinetics, a decrease in the extraction of a given lanthanide with an increase in the concentration of HNO_3, and an increase in the extraction of La^{3+} to Eu^{3+}. It was observed that lanthanides could be completely deloaded with > 2 M HNO_3 from TOPO-LA DES-loaded PU nanofibers. Among different leaching agents including hydrophilic DESs tested, HNO_3 was found to be the best leachant of REEs from Kerala sand. The REEs extraction from leach liquor (0.5 M HNO_3) showed that Th is extracted with high efficiency (95%) and Ce, La, and Nd are extracted with moderate efficiency (35–50%) in the presence of a large excess of Fe^{3+} ions. Th was found to sorb efficiently from 4 HNO_3 also.

KEYWORDS:

Polyurethane nanofibers deep eutectic solvent electrospinning separation

rare earth elements

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