

Recovery of platinum group metals by spent catalyst leachate by nanocellulose based material and direct re-use as catalyst

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The platinum group metal(PGM) is widely used as catalyst in various industries like petroleum industry. Due to rarity of the PGM, PGMs should be recovered from waste. Among various recycling method, bio-sorption is highly effective and eco-friendly method to recover metals from waste effluent. In this study, it is investigated that recovery of PGM from spent catalyst leachate by using nanocellulose based material and application of PGM adsorbed nanocellulose directly into catalyst. Nanocellulose exhibited various advantageous features as bio-sorbent as well as substrate of catalyst such as excellent stability and easily-functionalized surface chemistry. Various nanocelluloses were modified with Pt selective ligand and evaluated as bio-sorbent for selective recovery of PGMs. Among various nanocelluloses, cellulose nanofibril from tunicate(T-CNF) exhibited the highest Pt adsorption capacity and mechanical strength. Almost 90% of PGM selectively recovered with T-CNF fiber in simulated spent automobile catalyst leachate. Also, PGM adsorbed T-CNF fiber from waste leachate shows excellent catalytic activity without further treatment.