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New Industrial Application of Forward Osmosis (FO): Precious Metal Recovery from Printed Circuit Board (PCB) Plant Wastewater

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ABSTRACT

As a promising industrial application of forward osmosis (FO), an FO-based concentration system for precious metal recovery from printed circuit board (PCB) wastewater has been newly suggested. This novel FO concentration process utilizes a dilution-needed waste solution possessing high conductivity as a draw solution, and thus an external supply of draw solution as well as a re-concentration process for the diluted draw solution are not required. An electroless (E'less) nickel (Ni) plating solution was evaluated as dilution-needed waste stream-based draw solution, and the test results confirmed that the selected Ni solution could produce an acceptable FO performance, i.e., water flux of 39.4 LMH (active layer facing draw solution (AL-DS) mode with deionized feed solution). From a series of FO experiments conducted with a palladium (Pd) catalyst as a concentration-needed feed solution, the Pd solution was effectively concentrated under an active layer facing feed solution (AL-FS) mode with a slight impact from Pd scaling. The modeling prediction based on our experimental results showed that theoretically Pd can be concentrated 17.2-times-high. The