# 利用金屬有機架構物進行廢水中金之選擇性回收
# Selective Recovery of Gold in Wastewater by Using Metal-Organic Framework

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## 摘要

Due to the rapidly growing demand for electrical and electronic equipment, electronic waste (e-waste) has also increased and become a concern. As the main component of e-waste, printed circuited boards (PCBs) contain a variety of valuable materials, such as gold. Moreover, Recycling gold from waste PCBs is more economical and sustainable than ore mining. However, during the process of recycling PCBs, gold coexists with other metals in wastewater. Therefore, it is important to develop a proper adsorbent with high selectivity and capacity to efficiently recover gold from wastewater. Metal-organic frameworks (MOFs), a new type of porous material with a high specific area and ordered pore structure, have great potential for gold recovery. Different metals and organic ligands can form different types of MOFs with unique chemical properties. Thus, MOFs have been widely applied in various fields, especially in gas storage, sensing, catalysis, and drug delivery. In this study, $NH_2$-MIL-88B (Fe), an iron-based MOF, was used to selectively separate gold from wastewater. $NH_2$-MIL-88B (Fe) was synthesized via hydrothermal synthesis. $NH_2$-MIL-88B (Fe) exhibited a high specific surface area ($S_{BET}$) of 193.7 $m^2/g$ and the mean pore diameter was 3.9 nm. $NH_2$-MIL-88B (Fe) demonstrated a great gold recovery ability with a maximum adsorption capacity of 1331.2 mg/g for gold. At a low concentration of 10 mg/L, 99% of gold was recovered after 24 hours. Furthermore, $NH_2$-MIL-88B (Fe) showed high gold selectivity, with 98% gold recovered after 24 hours in a complex element environment and low gold concentration. The high selectivity and recovery ability possibly result from electrostatic attraction and the oxidation-reduction reaction of the amino group and $Fe^{2+}$ with Au. These results suggest that $NH_2$-MIL-88B (Fe) has great potential for gold recovery from e-waste wastewater.

關鍵字：金屬有機架構物、胺基、亞鐵離子、電子廢棄物、金回收

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