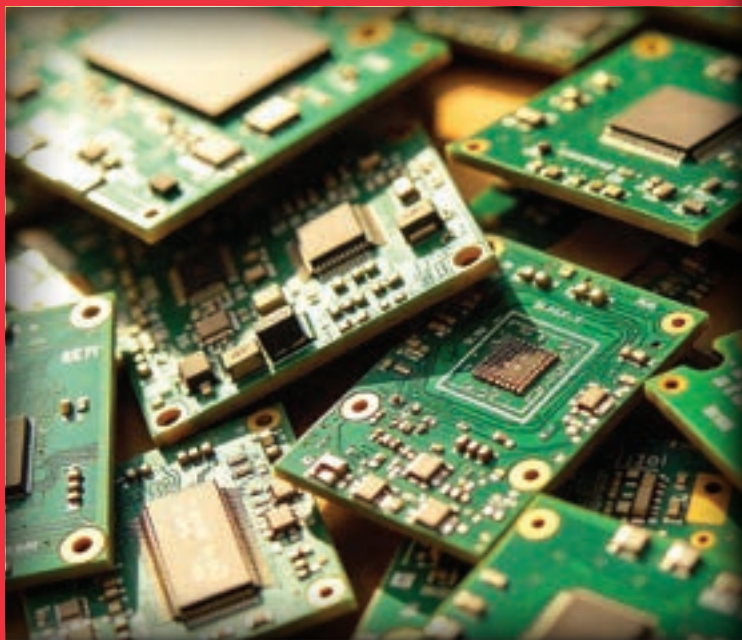




Eco-Friendly Solution for Precious Metal Recovery from Electronic Waste

SP Singapore
Polytechnic

Technology Licensing Opportunity

Technology Overview

A breakthrough set of chemical solutions has been developed to safely extract valuable precious metals (gold, palladium, and silver) from electronic waste and other metal-coated materials. Unlike current industrial methods that use highly toxic and dangerous chemicals these new solutions are

- Much safer for workers
- Better for the environment
- More efficient at extracting the precious metals
- More selective (meaning they target specific metals without mixing in unwanted ones)
- Cost effective and easy to use with existing equipment

In recent years, several countries have mandated environmental responsibilities to electronic manufacturers to establish producer recycling programs and banned the disposal of E-waste into landfills. E-waste contains precious metals, such as palladium, gold and silver that are highly sought-after by E-waste recycling companies due to their scarcity, high value and demand, and are actively traded as commodities over the last decades. Hence, the extraction of precious metals from E-waste is commercially attractive, and important in terms of resources recovery and environmental protection in alignment to Corporate Social Responsibility and Environmental, Social, and Governance goals.

Potential Applications

- Electronic wastes, such as precious metals-coated printed circuit boards, connectors, lead frame, wire bonding, CPUs, etc.
- Precious metal recovery
- Gold-, Silver-, or Palladium-Coated solid wastes
- Recovered precious metals can be further refined to be sold and reused

Commercialization / R&D Opportunities

- ✓ Ready for commercialization
- ✓ Looking collaborators for further development / to develop new applications
- ✓ Available for licensing
- ✓ Accepting business plans from interested parties

Intellectual Property -

- Patent pending

Technology Features & Specifications

- Superior extraction rates:
 - a. Gold: 96% recovery (≥ 3 g/L concentration)
 - b. Palladium: 86% recovery (up to 4 g/L concentration)
 - c. Silver: 97% recovery (>10 g/L concentration)
- Safer operations:
 - a. No to low toxic cyanide or strong acids
 - b. Moderate operating temperatures (40–90°C)
 - c. Reduced environmental impact
- Cost-effective:
 - a. Compatible with existing equipment
 - b. Lower waste treatment costs
 - c. High purity metal recovery

Unique Value Proposition

- Electronic waste (E-waste) generation is proliferating exponentially due to the ever increasing demand for electrical and electronic equipment (EEE) as a result of industrial revolution and development. Additionally, COVID-19 crisis has accelerated the march towards digital transformation contributing to increasing E-waste generation.
- The global e-waste management market was valued at USD 57.8 billion in 2022 and is projected to reach USD 244.6 billion by 2032, growing at a compound annual growth rate (CAGR) of 15.7% from 2023 to 2032.

Disclaimer

Although due care and attention have been taken to ensure that the preparation of this material is as accurate as possible, the contents of this brochure are provided for information purposes only. Neither the Singapore Polytechnic nor the inventors offer any warranty, written express or implied, as to the accuracy of the said contents. Applicants are advised to undertake independent evaluation of the technology.