11th World Congress and Expo on **Recycling**

June 13-14, 2019 | Edinburgh, Scotland

Leaching process for recovery of base and precious metals from crushed Waste Printed Circuit Boards (WPCBs)

Nanthanat Sriprasert and **Pakpong Sriprasert**
Mahasarakham University, Thailand

This research aimed to study various factors that influenced on the efficiency of leaching process and to assess the optimum conditions to achieve the efficient leaching method for base and precious metals from crushed waste printed circuit boards (WPCBs). Electrolyte solution receiving from leaching approach aim to further be used for base and precious metals recovery or refining processes. Chemical leaching temperature and contact time were fixed at 80 C for 120 minutes. Factors influenced on leaching efficiency including acid leachant types (sulfuric acid, nitric acid, hydrochloric acid and aqua regia), concentration of leaching solutions (2, 4 and 6 M) and solid/liquid ratio (10, 20 and 30 g WPCBs/ 50 mL leachant) were evaluated for oxidative leaching process. The results indicated that HNO_3 gave the best leaching ability for Cu and Pb and aqua regia showed highest leaching efficiency for Fe and Ni. Considering to types of metals, Cu was the most favorable to be leached from WPCBs into soluble form. Among the optimal conditions examined, the maximum Cu concentration was founded when HNO3 was applied at the concentration of 4 M and WPCBs 20 g/HNO3 50 mL which resulted in the highest Cu concentration of 386,820 mg/L in extracted electrolyte solution which is equivalent to 96.71 % Cu of dried WPCBs. The obtained dissolved Fe, Pb and Ni concentrations were only around 906.82, 357.41 and 148.95 mg/L corresponding to 0.15, 0.06 and 0.02 % of Fe, Pb and Ni of dried weight WPCBs, respectively.

Recent Publications

1. Zhang Y., He S., Sriprasert N., Banks C.J. and Heaven S., 2017, Competing demands for trace elements in anaerobic digesters, Paper presented to the 1st International Congress on Metals in Anaerobic Biotechnologies (IMAB17), Seville, Spain, the 4th - 6th October. Page 33 - 34.
2. Sriprasert N. and Sriprasert P., 2018, Hydrazine reduction process for copper recovery from spent copper etching solution from printed circuit board manufacturing, E-poster presented to the 9th World Convention on Recycling and Waste Management, Osaka, Japan, the 22nd-23rd October. Page 34.
3. Sriprasert N. and Sriprasert P., 2018, Recovery of copper from spent copper etching solution using wasted aluminum drill entry sheets from PCBs industry, E-poster presented to the 5th Global Summit and Expo On Pollution Control, Prague, Czech Republic, the 25th – 27th October.
4. Sriprasert N. and Sriprasert P., 2018, Using of iron filings for copper recovery from spent copper etching solution by cementation process, E-poster presented to the 9th International Conference on Recycling: Reduce , Reuse and Recycle, Vancouver, British Columbia, Canada, the 5th – 6th December.
5. Sriprasert P. and Sriprasert N., 2018, Electrowinning process for copper removal from spent etching solution in printed circuit boards manufacturing, E-poster presented to the 9th International Conference on Recycling: Reduce , Reuse and Recycle, Vancouver, British Columbia, Canada, the 5th – 6th December

Biography

Nanthanat Sriprasert and Pakpong Sriprasert are lecturer in Environmental Technology within Faculty of Environment and Resource Studies at Mahasarakham University, Thailand. Their research has currently focused on pollution control and environmental sustainability, especially, the process of utilising industrial and agricultural waste/wastewater into useful products by recycling. They have their expertise in waste recycling and waste management, particularly, technologies of base and precious metals recovery from E-waste and WPCBs manufacturing wastewater. They have built valuable results after years of experience in these researches. Dr Sriprasert, the first and corresponding author, obtained a BEng and MEng in Environmental Engineering from Suranaree University of Technology, Thailand. She was awarded her PhD by University of Southampton, the UK, for the work on requirement and distribution of trace elements in mesophilic anaerobic digestion. After her PhD study, she also retains a great interest in her PhD research area which is directly related to current practice in bioenergy production via anaerobic digestion and is the key research area at present for both renewable energy production and organic waste management. .