"Recent Trends In E-waste Management: Towards Revolutionizing Global Recycling"

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ABSTRACT

The spectacular developments in modern times have undoubtedly enhanced the quality of our lives. At the same time, these have led to manifold complications. Growth in Information technology and communication sectors have inflated the usage of electronic equipment exponentially. The problem of massive amount of hazardous wastes generated from electronic products called as E-waste i.e.,"Precious Rubbish" with the presence of indispensable materials in it. In the midst of electronic revolution, e-waste is one of the meteoric rising issues of the world with estimated proportions of 50 million tonnes per annum approximately. This escalating challenge calls for greater emphasis on recycling and better management. The present concept poster deals with highly advanced techniques of recycling e-waste. However, it is only in the recent era that microorganisms have been applied on a broader magnitude in order to obtain numerous rare and commercial metals. The recycled materials are used as paramount innovations such as batteries in electronic vehicles, medals, eco brick, aluminium handbags and jewellery. The approach of revolutionary recycling can lead to better prospects and could result in achieving milestone of social change paradigm.

Key words: *E-waste, precious rubbish, electronic revolution, paramount innovations, eco brick, social change.*

INTRODUCTION

- Electronic waste are detritus of electronic device that is obtained after its shelf life. All electronics are composed of myriad of elements.
- In order to conserve natural resources and the energy needed to produce new electronic equipment from virgin resources, equipments can be refurbished, reused and recycled instead of being land-filled.
- Management can be used as a strong tool where controlled and restricted adverse environmental and health implications can be sustained.
- Global challenges related to e-waste including environmental sustainability, human health and disease control is increasing gradually. However, about only 17.4% is recycled properly every year. Eco-friendly methods of recycling holds promise in all the areas of E-waste.

OBJECTIVES

- The goal is to acknowledge the environmentally safe and cost-effective techniques to recycle and reuse imperative materials in e-waste, that when placed into effect will either have decreased the total amount of waste created or a stranger control over the path of processing with e-waste being recycled, rather than discarded.
- The aim is also to utilize the materials extracted from e-waste innovatively.

METHODOLOGY

- Bioleaching being a established route in biotechnology is hence proven to be an applicable method for processing valuable metals here.
- Current state-of-the-art research on metal recovery from e-waste via biotechnology involves both autotrophic(i.e., sulphur and iron-oxidizers) and heterotrophic(e.g., cyanide producing telluride microorganisms).
- As heterotrophs tolerate a wider range of pH, cyanogenic bioleaching targets precious metals of platinum group such as Au and Ag, which are often not leachable by mineral acids.
- For instance, *Chromobacterium violaceum* extracted Gold from high-grade cell phone about 10.8% in only 8 days. Thus, compared to all other methods of extracting metals from E-waste, bioleaching is manifested to be one the successful techniques till date.

RESULTS AND DISCUSSION

Recent studies on Bioleaching for valuable metal recovery from E-waste

Microorganisms	Operational parameters T(°C) and pH	Leached metals%(mg/g PCB)
Sulfobacillus benefaciens	37°C, 1.7	Cu-99%(29mg/g)
Chromobacterium violaceum	30°C, 7.2	Au-69%
Acidophilus consortium	30°C, 3.0	Zn-92%(28mg/g)
Aspergillus niger	30°C, 3.5	Ni-95%(22.5mg/g)
Penicillium simplicissimum	30°C. 3.5	Al-95%(22.5mg/g)
Aspergillus ficcum	30°C, 3.0	REE's-75.4%

INNOVATIVE APPROACHES

Materials obtained from e-waste can be used in a very existing and emerging trends such as:

- Eco-bricks out-of plastic
- Handbags out-of Aluminum
- Batteries in electronic vehicles out-of Copper
- Jewellery out-of Iridium.
- Moreover, Tokyo Olympics purely used metals recovered from 78,985 tonnes of e-waste to produce about 5000 medals.

CONCLUSION

E-waste management as a whole is not just a scientific approach but indeed a socio-cultural facet to sum up the global requisite.

REFERENCES

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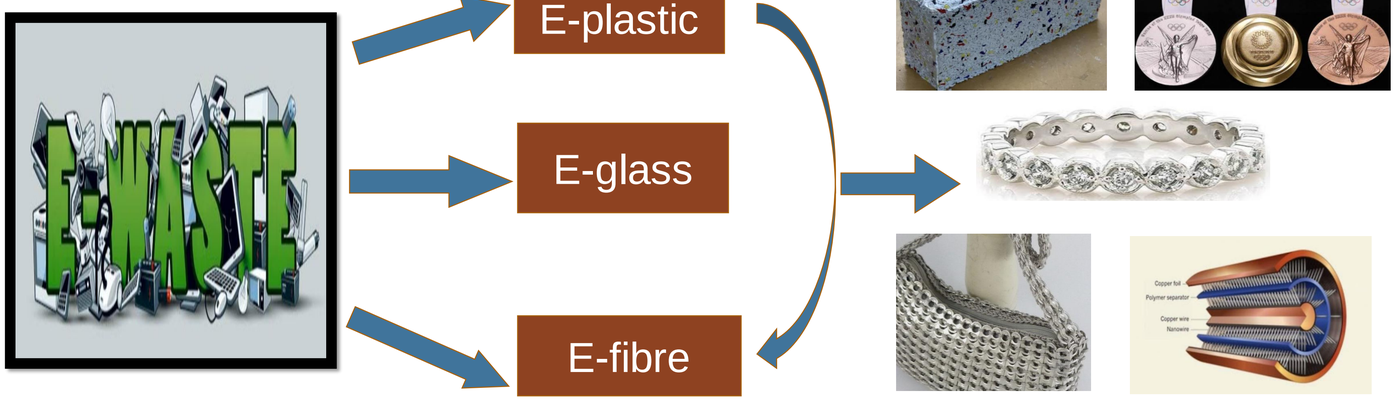
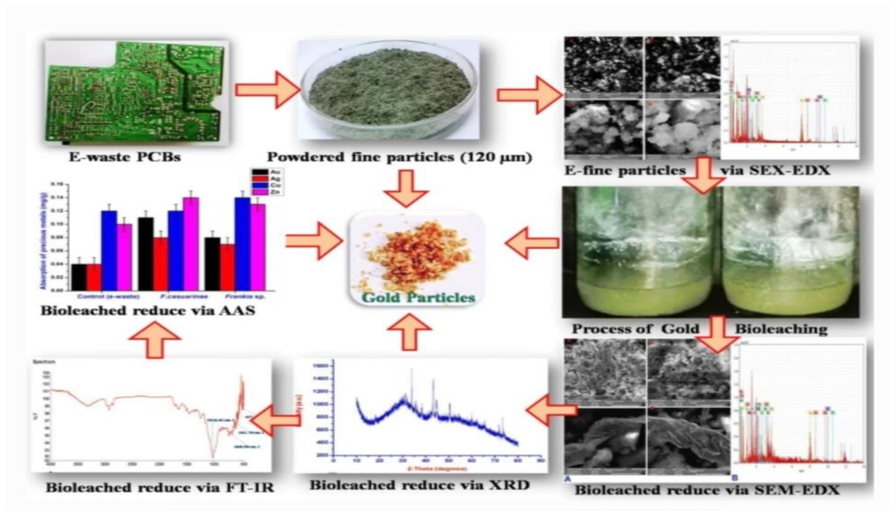
SCHEMES



Ingenious ideas via recycled e-waste materials



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Recovery of Gold from Printed circuit Board(PCB's)E-waste by Bioleaching