

## Circular Bio-economy of Copper and Gold from Electronic Wastes

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**Abstract :** Current work has attempted to establish the linkages between circular bio-economy and recycling of copper and gold from urban mine by applying microbial activities instead of the smelter and chemical technologies. Thereafter, based on the potential of microbial approaches and research hypothesis, the structural model has been tested for a significance level of 99%, which is supported by the corresponding standardization co-efficient values. A prediction model applied to determine the recycling impact on circular bio-economy indicates to re-circulate 51,833 tons of copper and 58 tons of gold by 2030 for the production of virgin metals/raw-materials, while recycling rate of the accumulated e-waste remains to be 20%. This restoration volume of copper and gold through the microbial activities corresponds to mitigate 174 million kg CO<sub>2</sub> emissions and 24 million m<sup>3</sup> water consumption if compared with the primary production activities. The study potentially opens a new window for environmentally-friendly biotechnological recycling of e-waste urban mine under the umbrella concept of circular bio-economy.

**Keywords :** urban mining, biobleaching, circular bio-economy, environmental impact

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