Green Electronics: A Feasible Solution to Reduce E-Waste Pollutions

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Modern electronic equipment and devices have brought unprecedented convenience to people's everyday life. At the same time, they also posed a serious threat to human health and the environment: For example, in 2019 only, more than 50 million tons of E-waste (electronic waste) was generated globally. These E-wastes will not only slowly release toxic chemicals, but also are made of non-degradable synthetic materials and they will exist in the natural environment for a long time. Can we make personal use electronics degradable? The objective of this research is to explore a practical solution to reduce E-waste pollution by using bio-degradable composite materials in the fabrication of recyclable electronic devices (Green Electronics). PLA (polylactic acid), one of the most commercially successful bio-plastics, was modified with a biomass particle filler and then employed as base substrates for the fabrication of electronic prototypes. A group of electronic devices with simple circuit structures were fabricated, and then their degradation behavior was studied. The degradation experiment was conducted in water at 50 Celsius for weeks until the composite substrates were visually fully degraded. The progress of degradation was monitored by measuring the weight change of the device and the amount of lactic acid (LA) released from the degradation. This study suggested that it is completely possible and feasible to make personal use electronics degradable and recyclable. We call on the legislature to pass laws and regulations pushing electronic manufacturers to use degradable materials for the fabrication of personal electronics.

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