

## Abstract

**Background:** Owing to the rising trend of agro wastes, efforts are being geared towards producing environmentally friendly welding flux. This project developed a nano-flux powder (MnO) from banana peel using nano-technology. For the first time, manganese was synthesized from banana peel ash. After that, the nano mixtures were centrifuged and calcinated to obtain nano flux powder.

**Methods:** The surface morphology and physio-chemical properties of the nanopowder produced and control were determined using X-ray Powder Diffraction, Transmission Electron Microscopy, and Scanning Electron Microscopy along with Elemental Dispersive X-ray to analyze its composition. Also, the particle size was obtained using the Digmizer image.

**Results:** The developed nano-flux powder has a mean area of  $407.72 \text{ nm}^2$ , a mean perimeter of  $51.02 \text{ nm}$ , and a length of  $3.89 \text{ nm}$  less than the commercial flux. The FTIR revealed the maximum peak of wave number  $415z.00 \text{ cm}^{-1}$ , which shows a broad high concentration than the control with wavenumber  $3546 \text{ cm}^{-1}$ . XRD result shows that manganese oxide is present in the powder with the highest intensity at MnO (110) with Quartz at  $2\theta = 26^\circ$ , having a current of  $9.26\text{A}$  and hematite at  $2\theta = 28^\circ$  having a current  $5.34\text{A}$  over the control. From the EDS of qualitative analysis of the powders, manganese and oxygen were present in high quantities in the developed flux with  $29.45\%$  and  $38.70\%$  than in control with  $3.15\%$  and  $23.30\%$ , which confirmed the nano-flux as Manganese Oxide (MnO). The results show that nano-flux powder can be produced from agrowaste with better properties and applications.

**Conclusion:** From the results and discussion, banana peel was used to develop Manganese oxide flux powder, using nanotechnology, and it was characterized alongside commercial flux powder as a control.

**Keywords:** Nanotechnology; agrowaste; banana peel; flux; nanoparticle; powder; welding