

Fabrication, characterization and X-band microwave absorption properties of  
PAni/Fe<sub>3</sub>O<sub>4</sub>/PVA nanofiber composites materials

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**ABSTRACT**

This work presents a study of microwave absorption properties of PAni/Fe<sub>3</sub>O<sub>4</sub>/PVA nanofiber composites with different ratio of Fe<sub>3</sub>O<sub>4</sub> nanoparticles. The morphology of the composites nanofibers study by Field Emission Scanning Electron Microscopes (FESEM) and Transmission Electron Microscope (TEM) showed that the low content of Fe<sub>3</sub>O<sub>4</sub> nanoparticles presence in the composites nanofibers indicates very much uniform surface, in the composites nanofiber without many bends, but some bends develop at higher content of Fe<sub>3</sub>O<sub>4</sub> nanoparticles as indicated in the TEM image. Image-J software was used to further investigate the diameter of the composites nanofiber and found to be in the range of 152 to 195 nm. The nanofiber composites show excellent electric and magnetic properties and therefore vary with the addition of Fe<sub>3</sub>O<sub>4</sub> nanoparticles in the composites nanofiber. In addition the PAni/Fe<sub>3</sub>O<sub>4</sub>/PVA composites nanofibers were further characterized by X-ray diffraction spectra (XRD) and Four Transformation infrared spectra (FTIR).