PANI supported Ag@TiO\textsubscript{2} nanocomposite was synthesized via oxidative polymerization of aniline on Ag@TiO\textsubscript{2}. The Ag@TiO\textsubscript{2} nanocomposite was synthesized by the photo reduction of Ag nanoparticles on hydrothermally synthesized TiO\textsubscript{2} nanofibers. Raman analysis revealed that the anatase phase of TiO\textsubscript{2} was synthesized showing typical peaks at 195 cm\textsuperscript{-1}, 396 cm\textsuperscript{-1}, 514 cm\textsuperscript{-1}, and 637 cm\textsuperscript{-1}. The incorporation of PANI, a carbonaceous material was confirmed by appearance of D-band and G-band in Ag@TiO\textsubscript{2}-PANI that were located at 1505 cm\textsuperscript{-1} and 1603 cm\textsuperscript{-1} respectively. X-ray diffraction (XRD) analysis confirmed the anatase phase of TiO\textsubscript{2} was synthesized. Transmission electron microscopy analysis (TEM) analysis revealed that TiO\textsubscript{2} nanofibers were synthesized successfully and Ag nanoparticles of different sizes were deposited on their surface. X-ray Photon Spectroscopy (XPS) survey scan of the Ag@TiO\textsubscript{2}-PANI nanocomposite revealed that the nanocomposite was made from C, O, Ag, Ti, and N. DRS and Tauc’s plot estimated the band gap of Ag@TiO\textsubscript{2}-PANI to be 3.0 eV. A comparative study of the photocatalytic performance of Ag@TiO\textsubscript{2}-PANI catalyst showed better degradation performance under both conditions than pristine TiO\textsubscript{2}, and Ag@TiO\textsubscript{2} with a degradation of up to 99.7% under visible light irradiation. The degradation experiments showed that the reactive species that were dominant in the degradation of BPA were h\textsuperscript{(sup)}+ and %O\textsuperscript{(sup)}-. Ag@TiO\textsubscript{2}-PANI nanocomposite was re-used to degrade BPA for up to four cycles without losing much of its photocatalytic ability with a removal of at least 90% in the fourth cycle.