In this study, undoped and 1, 2, 3, 4, and 5 wt % Ag-doped TiO₂ nanofibers have been fabricated by the electrospinning method applying 20 kV voltages at 8 cm height with a flow rate 0.1 mL/h. The antibacterial properties of undoped and doped Ag/TiO₂ nanofibers were tested on *Staphylococcus aureus* bacteria. The antibacterial effect of these fabricated nanofibers has been determined by disc diffusion and Baird parker methods. The results have shown that Ag/TiO₂ nanofibers have an excellent antibacterial effect on this bacterium compared to pure TiO₂ nanofibers. As a result, developed nanofibers can easily be applied in various fields such as biomedical sector and tissue engineering. In addition, the chemical components, morphology, and crystal structure of the nanofibers have been performed by scanning electron microscopy energy dispersive analysis (SEM-EDX), differential thermal analysis/thermal gravimetric analysis (DTA/TG), and X-ray diffraction (XRD) methods.