The Effect of Tungsten Oxide on Disinfection of E. coli

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The purpose of the experiment was to determine whether or not a tungsten oxide thin film could effectively inactivate Escherichia coli. Presently, unpurified water containing E. coli poses as a health and safety risk to billions of people around the globe. Therefore, this project was conducted to demonstrate the potential uses of tungsten oxide as a photocatalyst for water purification. Tungsten oxide thin films were prepared on a glass substrate through physical vapor deposition in a vacuum chamber. After the films were placed into a bacteria solution for an hour with exposure to visible light, the optical density of each sample was determined. It was hypothesized that if tungsten oxide films were used, then the optical density of the bacteria solutions would be lower than the solutions without a thin film (the control group). Analysis of the results revealed that bacteria solutions with the presence of a thin film truly had lower optical density levels than samples with no film. A t-test was calculated for the data and it demonstrated that the data was significant. Therefore, the results and data supported the research hypothesis. An explanation for the results would be that tungsten oxide has a small band gap in the visible light spectrum, which means that a smaller amount of visible light to generate electron-hole pairs to produce reactive oxygen species and kill bacteria. In conclusion, tungsten oxide has the ability to disinfect E. coli in water.

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