Optimization and Application of Kelvin Water Dropper

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Kelvin water dropper is an electrostatic generator that uses falling water to generate voltage differences by electrostatic induction occurring between interconnected, oppositely charged systems. This device is valued because of its rich physical ideas and its potential to generate high voltage without an outer energy source. However, the electrification and discharge effect of this device is not very good. It is mainly used as a teaching apparatus and has few practical applications. Based on the basic principle of the Kelvin water dropper, this research divided the Kelvin water dropper into three systems: water supplying system, induction system, and water collection system. The physical mechanism and influencing factors of each system are investigated. With the quantitative analysis, this research optimizes and integrates the device, striving to enhance the speed and amount of charge accumulation and construct a better and more stable version of the device. This is the cornerstone of the practical application of this device. Currently, the COVID-19 is ravaging the world. This research takes the reuse of wastewater from the hand-washing area of public toilets as an example and designs a sterilization and dust removal system to explore the possibility of the practical application of Kelvin water droppers in related engineering fields. As it can work without an external power supply, the practical application of the Kelvin water dropper in this research can improve the hygienic conditions of toilets, save electricity and realize the green reuse of the wastewater.