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3P27 - Sterilization of E. coli in seawater using discharge in water and dielectric barrier discharge

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Ballast water is seawater that is loaded as a "weight" to maintain restoring force when a large cargo ship is not loading luggage. In order to balance the sailing at a shipping route where there is generally no load or less luggage, pump up seawater at the port of the departure place and pump out it with loading at the port of the arrival place. Since ballast water also contains inherent microorganisms and bacteria in area that collecting water, problems that the ecosystem around the port of the arrival place is seriously damaged due to such as alien species have occurred. This study is sterilization of E.coli using discharge in water and dielectric barrier discharge (DBD). The conductivity of water was 44500 µS/cm (seawater). In this experiment, the power supply voltage was applied 30 kV, the size of the reactor was 10 cm × 10 cm × 10 cm, and the electrode were a copper (diameter was 0.8 mm) and tungsten(diameter was 1.0 mm). The conductivity was adjusted by placing potassium nitrate in purified water. The amount of water was 500 ml. and the initial number of E.coli was adjusted absorbance was 0.15 at a wavelength of 600 nm. The frequency were 50 and 250 pps. the applied pulse number was 0, 1000, 5000, 10000, 25000, 50000, 75000 and 100000, Samples were taken and bacteria were enumerated. As a result, in the case of discharge in water, the number of bacteria was hardly changed until 10,000 pulses, however, it decreased from the 10000 pulse onward, and throughout, the number of bacteria decreased with increasing pulse number. In the case of DBD, the number of colonies decreased significantly compared with discharge in water. It is considered to be due to the difference in discharge range.

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