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Development of an optimal bio-sensor with quantitative real-time monitoring of microbial hazards in water environment

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Despite efforts for providing clean water, problems such as water-borne disease outbreaks in water are constantly occurring. In order to solve these problems, it is necessary to control the microbial hazards in the water environment. The monitoring system for the presence and exact amount of microorganisms must be preceded to implement this system. So we designed an optimal bio-sensor for the real-time monitoring diagnosis. For developing an algorithm with representative microbes in water, we selected seven target bacteria through the Next Generation Sequencing (NGS) technique, Illumina miseq analysis method. After making an electrochemical biosensor, it was tested using an impedance measurement with appling lap-on-a-chip. The appropriate frequency range is 10-1000 Hz for bacteria, *Escherichia coli* by comparing the sensor signal deviation according to the difference types of media conditions. A result of *E. coli* experiments showed excellent linearity in the 500 to 105 CFU/mL concentration range. Similarly, the specificity and sensitivity of the sensor for other target microorganism are evaluated compared with their concentrations. The correlations between the patterns from manufactured device and the amount of the target microorganism identified by the real-time qPCR using data mining was applied to developed an algorithm. By presenting the bio-sensor, this could be the basis for microbial hazard management in water environment for clean water supply.

Biography

Yoorae Noh completed her Master's degree in Civil and Environmental Engineering at Yonsei University. She has been working under the supervision of Prof. Joonhong Park and her thesis entitled "Bacterial characterization of active microbiomes from urban drinking water supply systems". Now, she is preparing to apply for PhD in Microbial Technology.

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