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Real-time detection of microbial contamination in water using intrinsic fluorescence

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With the rapid increase in global population and potential water shortage, water quality has become a concern. In some extreme cases such as Arizona, we may have to switch from toilet to tap within the near future. However, our current monitoring methods for drinking water have limitations and do not provide fast and reliable results to deal with these challenges. By using intrinsic fluorescence, microbial contamination in water can be monitored in real-time, continuously, without sample contact and at very low concentration. The detection limit is approximately 50 cells/L. By introducing a light pulse, cellular components of microorganisms can be excited and as a result they will fluoresce. In addition, some of the cellular components (fluorophores) that fluoresce in these microorganisms can be used as indicators to distinguish viable cells, non-viable cells and spores. In our study, three different wavelength regions were used to excite specific cellular components: UV, red and amber light. The fluorophores targeted are reduced pyridines nucleotides and flavins, cytochromes, and calcium dipicolinic acid as indicators for viable cells, non-viable cells and spores respectively. The emissions collected allowed us to distinguish among viable cells, non-viable cells and spores. By using this method, a wide range of microorganisms such as bacteria, protozoa, amoeba and other microorganisms of concern can be detected. This capability is particularly useful continuous monitoring of water quality and determining the efficacy of decontamination procedures.

Biography

Aminata Kilungo is a 4th year PhD student in Soil Water and Environmental Science and Microbiology and a current recipient of Sloan and BIOME fellowships. She is interested in rapid methods for monitoring drinking water quality and developing real-time methods to detect for pathogens in drinking water. She has worked for private and non-profit organizations. As an environmental consultant, her work involved building environmental sensors. Her work with non-profit organizations focused on environmental pollution and health impacts to communities in southern Arizona and along the US- Mexican border.

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