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Real-time In-situ detection of microbes

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Currently, no methods exist for the real-time detection and quantification of microbes in the environment or the detection and identification of pathogenic organisms in clinical specimens. We have addressed these problems with the development of technologies which overcome these limitations and provide detection limits as low as a few microbes per L in water, per cm2 on abiotic surfaces, and per mL in body fluids. The detection and quantification of microbes [total microbial load] is based on the intrinsic fluorescence of microbial metabolites and protein cofactors and provides an estimate of the total microbial load as well as the relative distribution of live cells, dead cells, and endospores. Unlike existing methods, no additional reagents or sample contact is needed. This technology has been applied to the in-situ measurements of two sub-glacial microbial communities at sites in the Svalbard Archipelago, Norway, the efficacy of disinfection of contact lenses, determination of water quality from wells in Ifakara, Tanzania, and the in-line monitoring of water quality. In the rapid spread of a life-threatening infection, early diagnosis is of great importance. In such situations, pathogen counts will be very low, which also presents a significant challenge to diagnostic methods. We have developed a point-of care disposable diagnostic based on the en masse capture of bloodborne microbes from 1 mL of fresh whole blood with surface-tethered, small molecule ligands. Quantification is based on the intrinsic fluorescence of captured cells.

Biography

Linda Powers is the Thomas R Brown Chair in Bioengineering and Professor of Electrical and Computer Engineering as well as Biomedical Engineering. After receiving her PhD from Harvard University, she was a member of technical staff at AT&T Bell Laboratories. She has a broad scope of expertise from biochemistry to electrical engineering and has authored more than 125 technical publications in refereed journals. She is a fellow of the American Physical Society and the American Institute of Chemists and her honors include the US Bioenergetics Award of the Biophysical Society. She initiated two start-up companies based on her technology.

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