

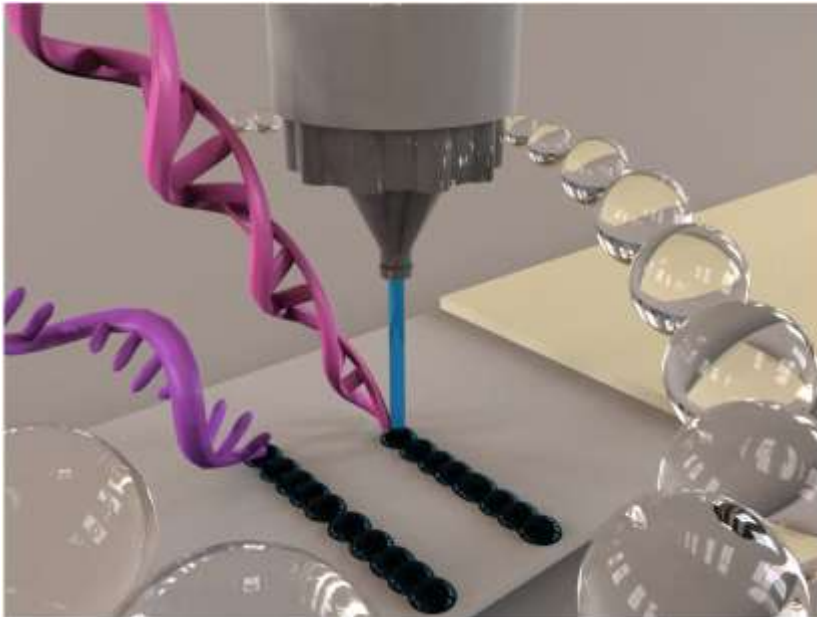
## BIO - NANOPATTERNING: INKJET PRINTED NANOPATTERNED APTAMER - BASED SENSORS FOR IMPROVED OPTICAL DETECTION OF FOODBORNE PATHOGENS

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The increasing incidence of infectious outbreaks from contaminated food and water supplies continues to impose a global burden for public health. There is a market demand for on-site, disposable, easy-to-use, and cost-efficient pathogen sensing devices. Despite the rapid growth of biosensing as a research field, and the generation of breakthrough technologies, more than 80% of the biosensors developed at the laboratory scale never will get to meet the market. This work presents a cost-efficient, reliable, and repeatable aptasensing platform for the whole-cell detection of foodborne pathogens in real food samples. An optimized inkjet printing platform was designed, taking advantage of the carefully controlled bionanopatterning of novel carboxyl-functionalized aptameric inks on a nitrocellulose substrate. The



The aptasensors demonstrated a highly efficient detection of whole-cell *E. coli* O157:H7 ( $10^1$  colony forming units (CFU)  $\text{mL}^{-1}$  in pure culture and  $10^2$  CFU  $\text{mL}^{-1}$  in ground beef), with no need for cell lysis. This sensing platform has a controlled sensing response variation within  $\pm 1$  SD for at least 75% of the data collected even at very low concentrations. To the best of the authors' knowledge, this work reports the lowest limit of detection of a paper-based whole-cell optical sensor for *E. coli* O157:H7, with enough evidence to prove its high repeatability, as well as specificity at genus, species, strain, and serotype level.