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Dissolvable bridges for manipulating fluid volumes in porous membrane networks

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Porous membrane-based lateral flow assays are used to diagnose many conditions in limited-resource settings due to their low cost and user-friendly format. However, commercial lateral flow assays typically only run single-step processes that may lead to inaccurate results for low concentration analytes. Our goal is to create more sophisticated assays that can perform automated multi-step processes to achieve higher sensitivity detection. In order to achieve this goal, porous fluidic valves for the precise regulation of fluid flow in these devices are needed. We have developed a simple shut-off valve that passes a well-defined volume of fluid before permanent shut-off. These dissolvable bridges offer a way to automate the metering of reagent volumes that would otherwise require the user to pipet exact volumes into the device. We have characterized the operation of the valves and demonstrated their tunability using parameters such as geometry and composition of the dissolvable bridge. In addition, we have demonstrated the utility of dissolvable bridges in the important context of automated delivery of multiple volumes from a common source to different locations in an assay for simple device loading and activation. Dissolvable bridges have the potential to help bring advanced testing using porous membrane networks to limited-resource settings.

Biography

Jared Houghtaling is an undergraduate junior in the Bioengineering Department at the University of Washington. He has spent two years working on point-of-care diagnostics development in the Fu lab. He is a co-author on several publications in the field. Following his undergraduate studies, Jared plans to pursue a Ph.D. in bioengineering.

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