

Engineering Sustainable Resources for CRISPR-based Diagnostics

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I will discuss our development of a robust multiplexed CRISPR-based detection using orthogonal CRISPR-associated enzymes to simultaneously diagnose SARS-CoV-2 infection and pinpoint the causative SARS-CoV-2 variant of concern (VOC)—including recent globally dominant VOCs Delta (B.1.617.2) and Omicron (B.1.1.529), as well as our implementation, with approval of the FDA of Thailand, of the CRISPR-based test technology. The platform has features for point-of-care (POC) use: premixed, freeze-dried reagents for easy use and storage; convenient direct-to-eye or smartphone-based readouts; and a one-pot variant of the multiplexed detection. To reduce reliance on proprietary reagents and enable sustainable use of the technology in low- and middle-income countries, we locally produce and formulate our own recombinase polymerase amplification reaction and demonstrate its equivalent efficiency to commercial counterparts. Our tool—CRISPR-based detection for simultaneous COVID-19 diagnosis and variant surveillance which can be locally manufactured—may enable sustainable use of CRISPR diagnostics technologies for infectious diseases in POC settings.
