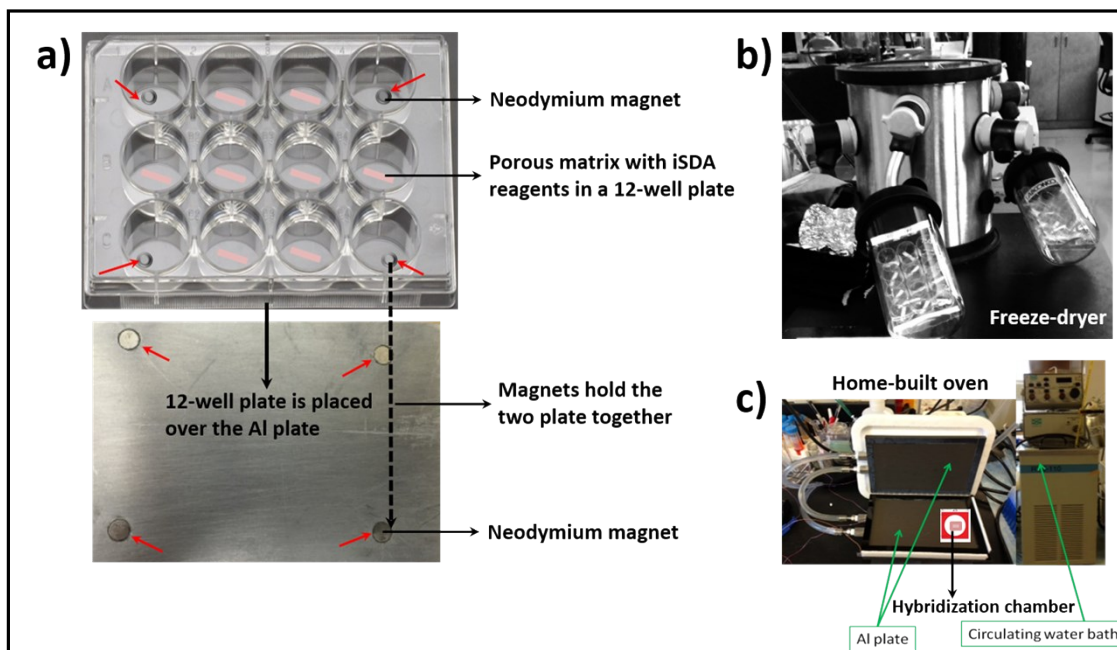
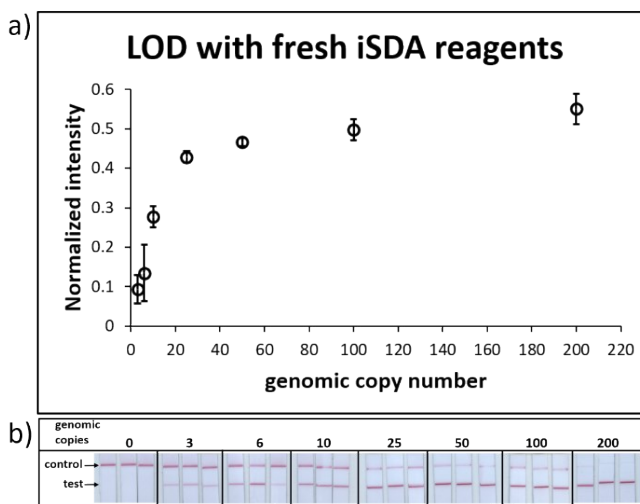


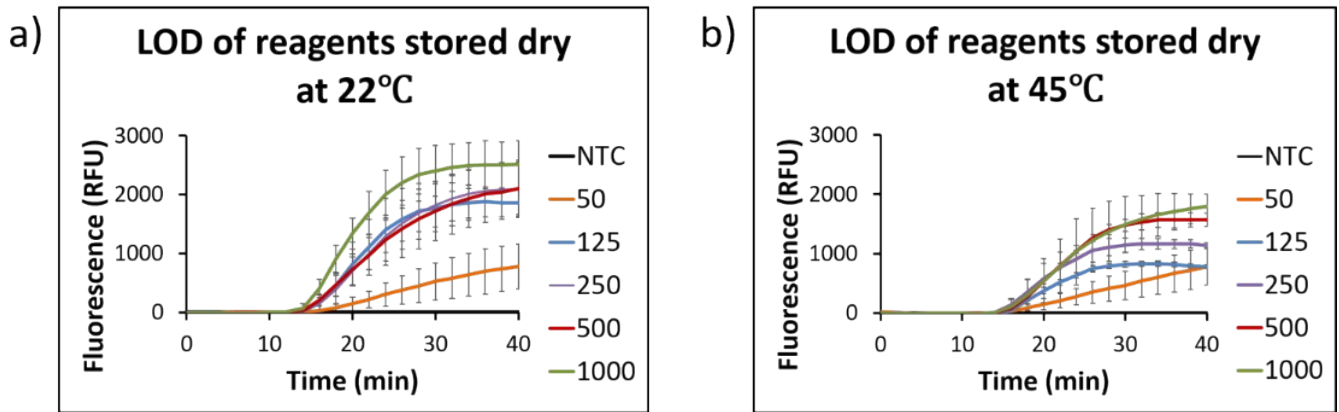
Supplementary Information



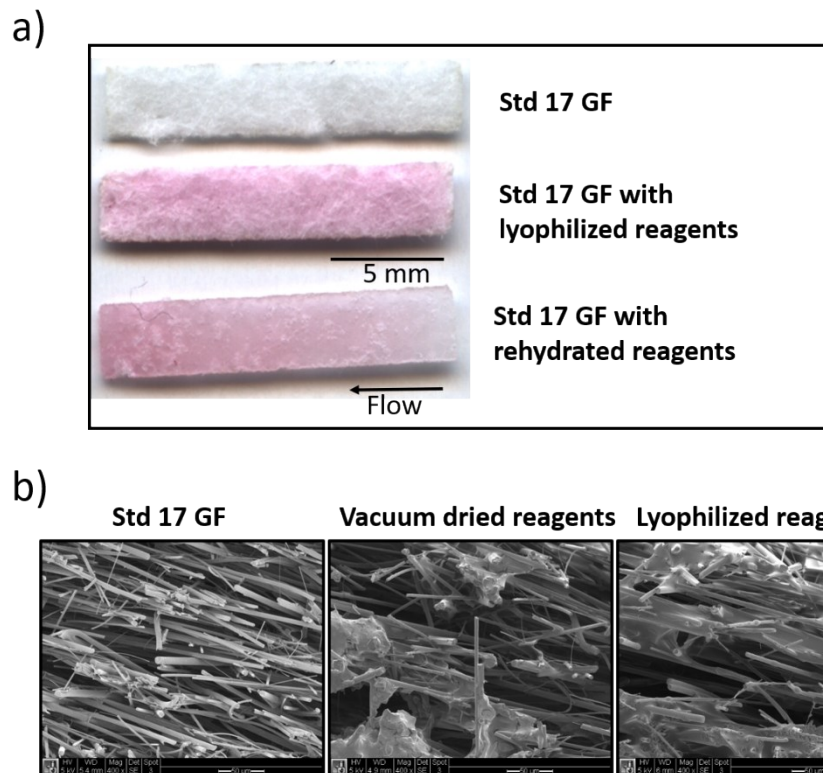
Supplemental Figure S1. Experimental setup for lyophilization, and amplification in a porous matrix. a) 12-well plate containing iSDA reagent pads and magnets (red arrows) is placed over an aluminum (Al) plate with four magnets embedded in the corners (red arrows). The magnets hold the plates together during flash-freezing in liquid nitrogen. b) Lyophilizer with well plates inside a fast-freeze flask c) custom-built oven for performing iSDA in the Secure-Seal hybridization chamber.



Supplementary Figure S2. Limit of detection (LOD) for *ldh1* iSDA with fresh reagents in Std 17 GF. a) Chart showing signal intensities of the LF strips test line for a range of MRSA genomic copies and shown below, b) corresponding LF strip images at varying genomic copy number. Note the signal intensities of control line increasing with decreasing copy number.



Supplementary Figure S3. LOD of *ldh1* iSDA with reagents stored in Std 17 GF for 360 h storage in the presence of trehalose and dextran (TD 500) measured by real-time fluorescence at a) 22 °C and b) 45 °C. Curves are mean of 3 replicates, and error bars are standard deviation. The lift-off time for all copies was ~15 minutes; however, the peak fluorescence for 22 °C was higher than 45 °C, indicating lower amplification efficiency at higher temperature storage.



Supplemental Figure S4. a) Flatbed scanned images of Std 17 GF. Lyophilized reagents in Std 17 GF appear uniform across the glass fiber pad. Rehydrated pad shows reagent spread without excessive variation in reagent concentration as visualized by the Au label. b) Scanning electron micrographs of Std 17 GF (scissor-cut cross-section) as received from the manufacturer, iSDA reagents in Std 17 GF dried by vacuum centrifugal evaporator and by lyophilization. Pore features in Std 17 GF are observable over a large length scale (~1-50 µm) with a range of fiber diameters. Reagents dried by vacuum appear as large clumps and seem to have a low surface area to volume ratio. In the lyophilized sample, the reagents migrate to the small features and appear as dry sheets stretched across the void with high surface area to volume ratio compared to the vacuum-dried sample.