

Supplementary Information

A Fully Integrated Lab-on-a-Disc for Nucleic Acid Analysis of Food-borne Pathogens

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Movie 1. RPA on a disc

The total process of the fully automated RPA on a disc was visualized using color dye solution. The movie was captured using a CCD camera and a strobe light. For better visualization, color dyed solutions were utilized.

Computer simulation

COMSOL Multiphysics (COMSOL, USA) software was utilized for simulation study. The heat absorbed on body by laser irradiation can be expressed by

$$Q(x, y, z) = Q_0(1 - R_c) \frac{A_c}{\pi \sigma_x \sigma_y} e^{-\left[\frac{(x-x_0)^2}{2\sigma_x^2} + \frac{(y-y_0)^2}{2\sigma_y^2}\right]} e^{-A_c z}$$

where Q_0 is power input, R_c is reflection coefficient, A_c is absorption coefficient, σ is length of each axis in case of ellipse laser beam,¹ however σ is equal to beam diameter in our study because we used a circular beam laser diode for our experiment. We also utilized 808 nm laser diode and irradiated beam diameter on metal plate (10 mm x 10 mm) was 2 mm. Reflection coefficient and absorption coefficient are 0.867 and $1.13 \times 10^6 \text{ cm}^{-1}$, respectively. 0.67 W laser irradiation for 300 s was set to provide heat to reach the same temperature with our experimental value for RPA and temperature profiles at this moment were obtained as shown in **Figure 3c,d,e,f**.

Reference

1. Yang, S. T.; Matthews, M. J.; Elhadj, S.; Cooke, D.; Guss, G. M.; Draggoo, V. G.; Wegner, P. J., Comparing the use of mid-infrared versus far-infrared lasers for mitigating damage growth on fused silica. *Applied Optics* **2010**, *49*, 2606-2616.

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