SUPPORTING INFORMATION

Patterning and Fluorescence Tuning of Quantum Dots with Haptic-Interfaced Bubble Printing

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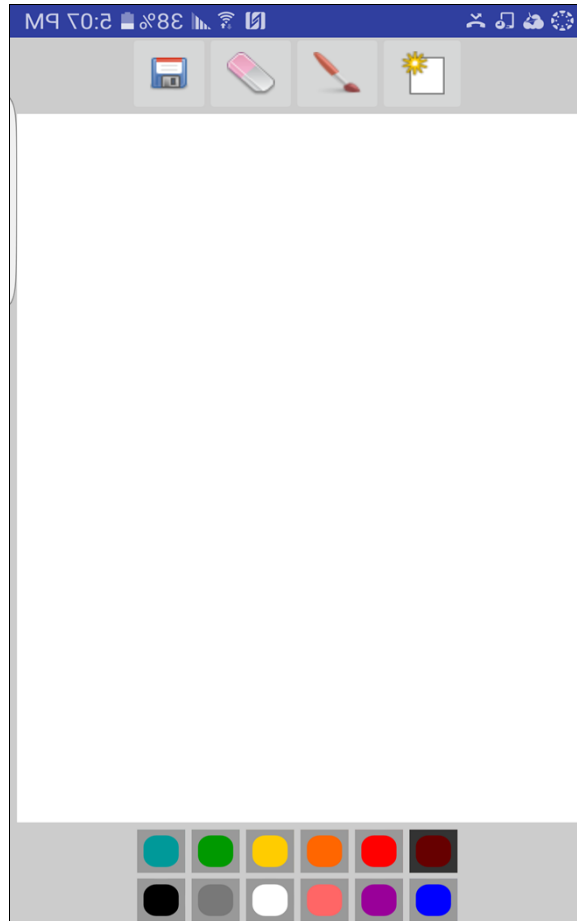
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Figure S1: A schematic of the draw-view of the app showing the various buttons such as save, undo, and new file.
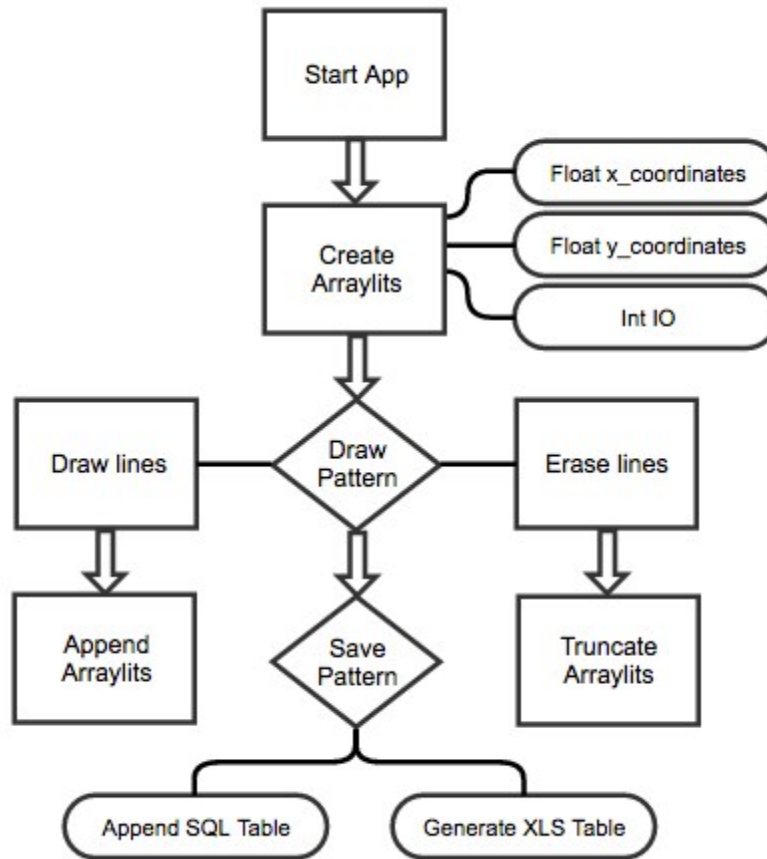
Figure S2: A flow chart of the algorithm for registering and populating the coordinate and shutter matrix based on the hand-drawn pattern and touch event, respectively. In order to provide vector coordinates that are compatible with our bubble printing, the app initializes, updates, and keeps track of three arraylist variables: x_coordinates, y_coordinates, and IO. We utilize Android's built-in coordinate system as well as built-in event.getX() and event.getY() methods to populate the x and y arraylists with Float coordinates as the user is drawing. The IO arraylist is populated simultaneously with 0 and 1. 1 indicates that the laser beam should be turned on, and 0 to indicate that it should be turned off. Before the arraylists are saved, the first coordinates entered (X_i,Y_i) - the first coordinates touched in the drawing - are subtracted from each x and y coordinate respectively to make (X_i,Y_i) the origin of our pattern. Upon saving a finished pattern, the three arraylists are saved into an XLS Excel file and uploaded to an SQL database table hosted by XAMPP. The excel file and the SQL database table are both constructed of three columns: x_coordinates, y_coordinates, and IO.
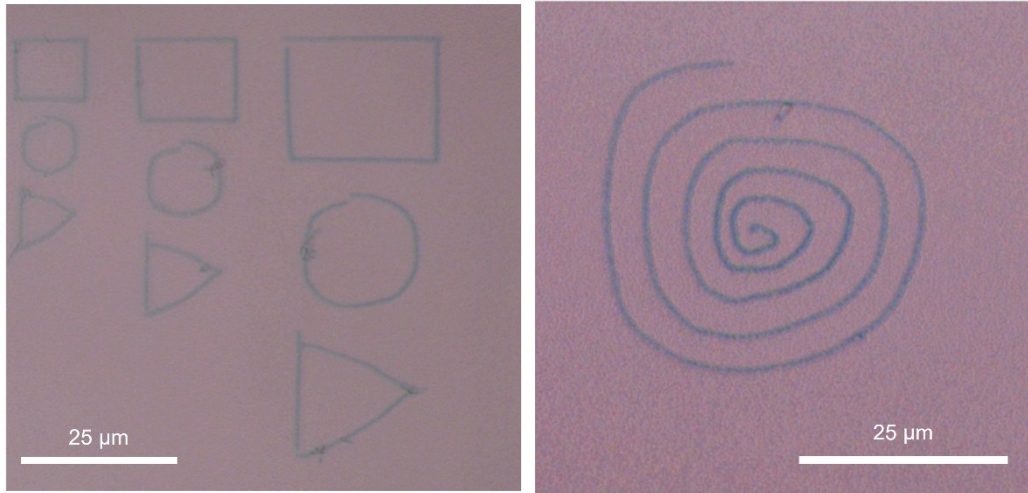
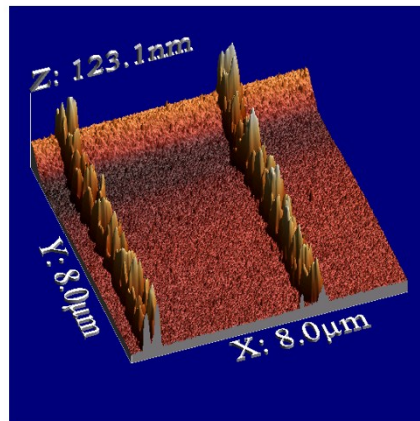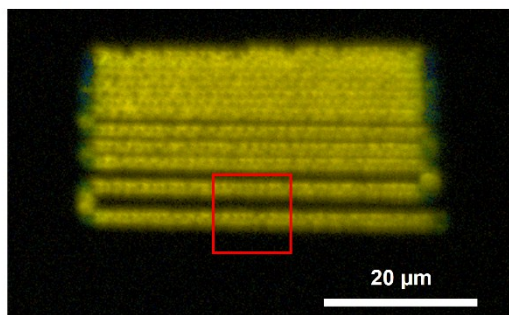Figure S3: Bright-field optical images of the patterns of QDs on plasmonic substrates by HIBP.

Figure S4: (*left*) Fluorescence image of the bubble-printed QDs. (*right*) Atomic force micrograph of the square region in the fluorescence image. The image depicts a linewidth of ~510 nm.
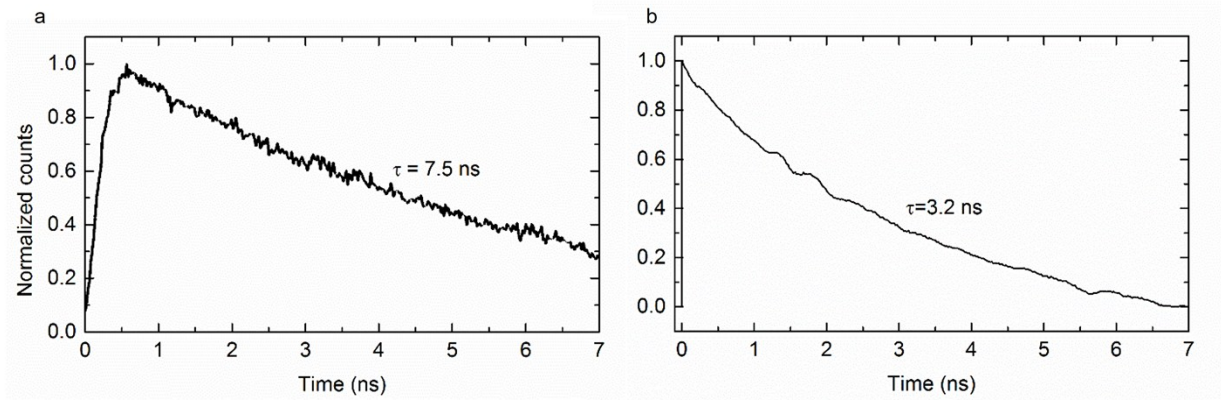
Figure S5: (a) Fluorescence lifetime of QDs on a glass substrate. (b) Fluorescence lifetime of QDs drop-casted on an AuNI substrate. The plots were recorded by time-correlated fluorescence measurement technique.
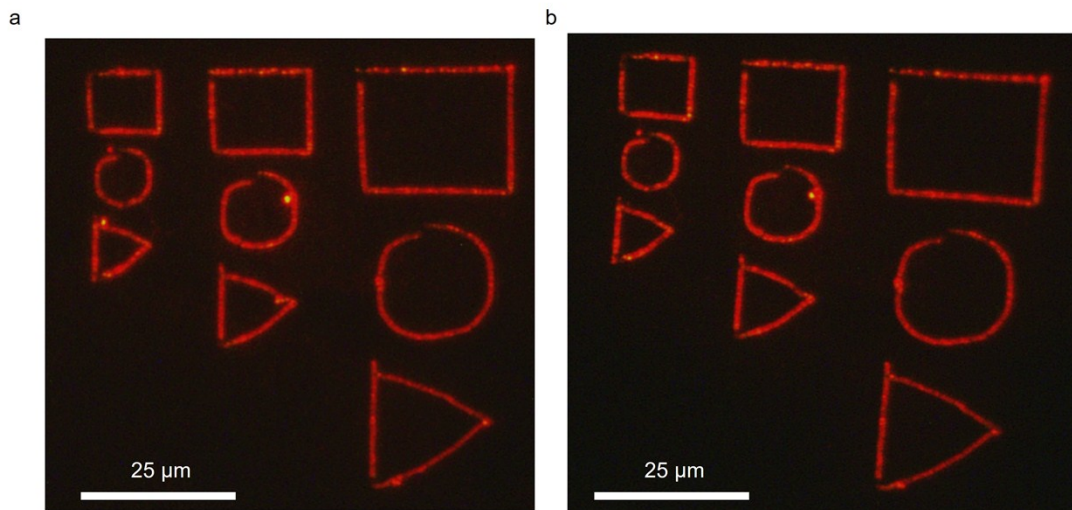
Figure S6: (a) The initial fluorescence image of the HIBP-printed sample. (b) The fluorescence image of the same sample after its sonication in DI water for 5 mins. The similar images indicate the strong adhesion of QDs over the substrate.