

# Supporting Information

## **Nanoporous Hard Data: Optical Encoding of Information within Nanoporous Anodic Alumina Photonic Crystals**

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## Figure Captions

**Figure S1.** Generation of a 8-bit ASCII encoding system in nanoporous anodic alumina photonic crystals by MSPA. Single sinusoidal anodisation waves (left), anodisation profile with resulting multi-sinusoidal waveform (centre – inset showing magnified view) and SEM cross-section image of a NAA photonic crystal with codes (NB: inset displays a digital picture of the resulting NAA photonic crystal): 01000000 (number of waves ON = 1 –  $T_p$  = 450s), 01100000 (number of waves ON = 2 –  $T_p$  = 450 and 525s), 01110000 (number of waves ON = 3 –  $T_p$  = 450, 525 and 600s), 01111000 (number of waves ON = 4 –  $T_p$  = 450, 525, 600 and 675s), 01111100 (number of waves ON = 5 –  $T_p$  = 450, 525, 600, 675 and 750s), 01111110 (number of waves ON = 6 –  $T_p$  = 450, 525, 600, 675, 750 and 825s) and 01111111 (number of waves ON = 7 –  $T_p$  = 450, 525, 600, 675, 750, 825 and 900s).

**Figure S2.** Optical encoding of information within the transmission spectrum of nanoporous anodic alumina photonic crystals. Transmission spectrum and photonic barcode of NAA photonic crystals with codes: 01000000 (number of waves ON = 1 –  $T_p$  = 450s), 01100000 (number of waves ON = 2 –  $T_p$  = 450 and 525s), 01110000 (number of waves ON = 3 –  $T_p$  = 450, 525 and 600s), 01111000 (number of waves ON = 4 –  $T_p$  = 450, 525, 600 and 675s), 01111100 (number of waves ON = 5 –  $T_p$  = 450, 525, 600, 675 and 750s), 01111110 (number of waves ON = 6 –  $T_p$  = 450, 525, 600, 675, 750 and 825s) and 01111111 (number of waves ON = 7 –  $T_p$  = 450, 525, 600, 675, 750, 825 and 900s).

**Figure S3.** Optical encoding of the string '*the university of adelaide*' within the transmission spectrum of nanoporous anodic alumina photonic crystals. Anodisation profile, transmission spectrum and photonic barcode of a NAA photonic crystal with codes: 01100001 = '*a*' (number of waves ON = 3 –  $T_p$  = 450, 525 and 900s), 01100100 = '*d*' (number of waves ON = 3 –  $T_p$  = 450, 525 and 750s), 01100101 = '*e*' (number of waves ON = 4 –  $T_p$  = 450, 525, 750 and 900s), 01100110 = '*f*' (number of waves ON = 4 –  $T_p$  = 450, 525, 750 and 825s), 01101000 = '*h*' (number of waves ON = 3 –  $T_p$  = 450, 525 and 675s), 01101001 = '*i*' (number of waves ON = 4 –  $T_p$  = 450, 525, 675 and 900s), 01101100 = '*l*' (number of waves ON = 4 –  $T_p$  = 450, 525, 675 and 750s), 01101110 = '*n*' (number of waves ON = 5 –  $T_p$  = 450, 525, 675, 750 and 825s), 01101111 = '*o*' (number of waves ON = 6 –  $T_p$  = 450, 525, 675, 750, 825 and 900s), 01110010 = '*r*' (number of waves ON = 4 –  $T_p$  = 450, 525, 650 and 825s), 01110011 = '*s*' (number of waves ON = 5 –  $T_p$  = 450, 525, 600, 825 and 900s), 01110100 = '*t*' (number of waves ON = 4 –  $T_p$  = 450, 525, 600 and 750s), 01110101 = '*u*' (number of waves ON = 5 –  $T_p$  = 450, 525, 600, 750 and 900s), 01110110 = '*v*' (number of waves ON = 5 –  $T_p$  = 450, 525, 600, 750 and 825s) and 01111001 = '*y*' (number of waves ON = 5 –  $T_p$  = 450, 525, 600, 675 and 900s).

**Table S1.** Characters, ASCII codes, anodization period of raw sinusoidal waves and interferometric colour of characters composing the string '*the university of adelaide*'.

Figure S1

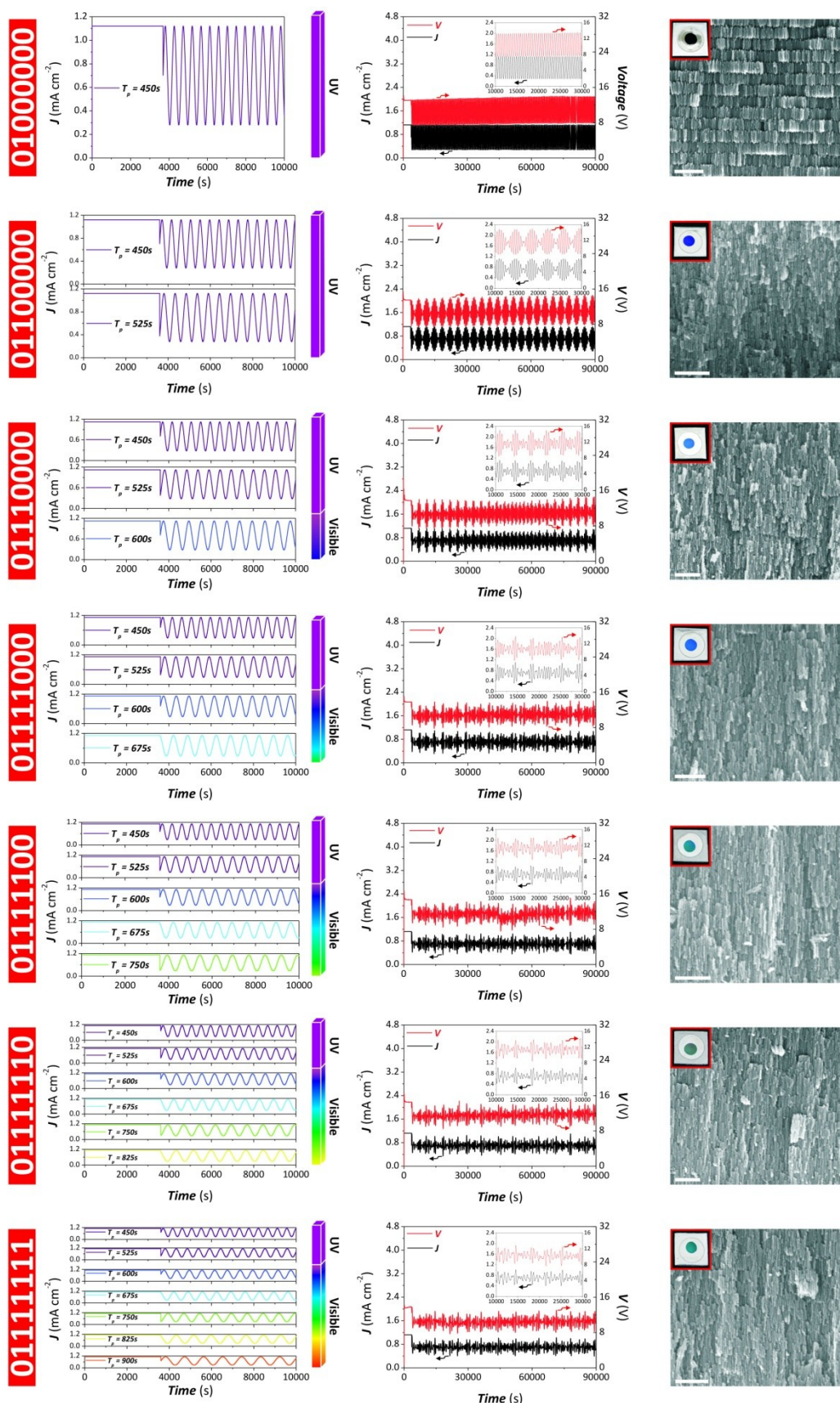


Figure S2

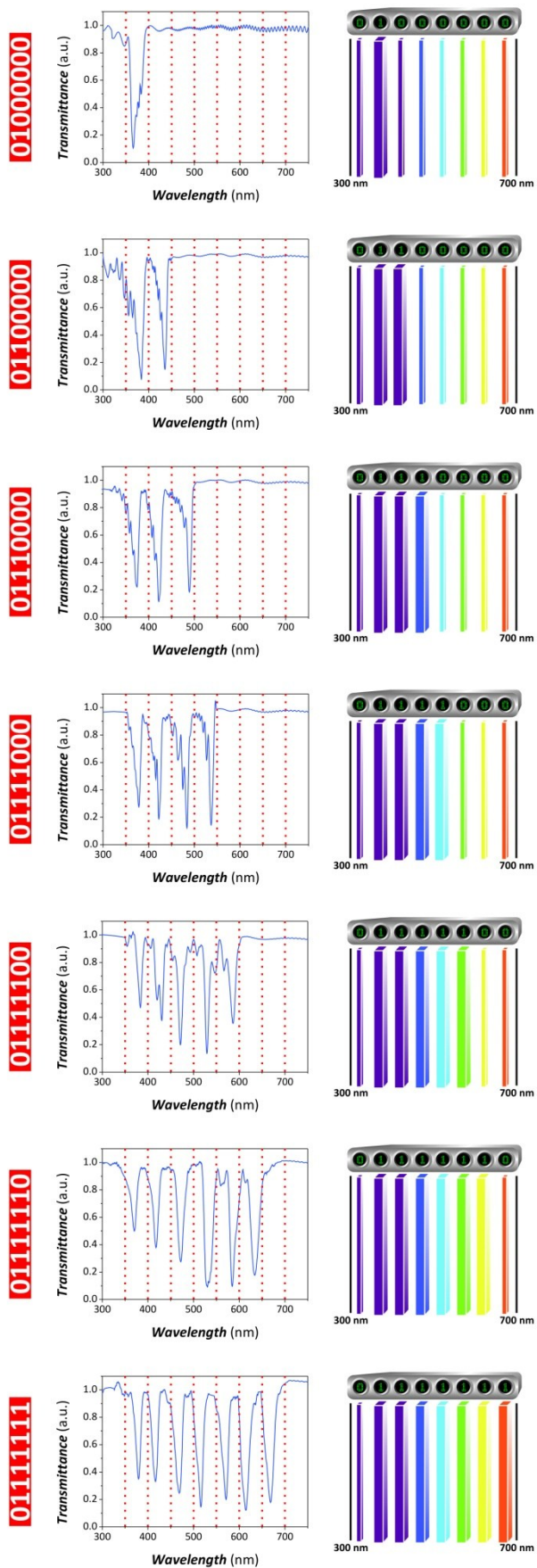




Figure S3

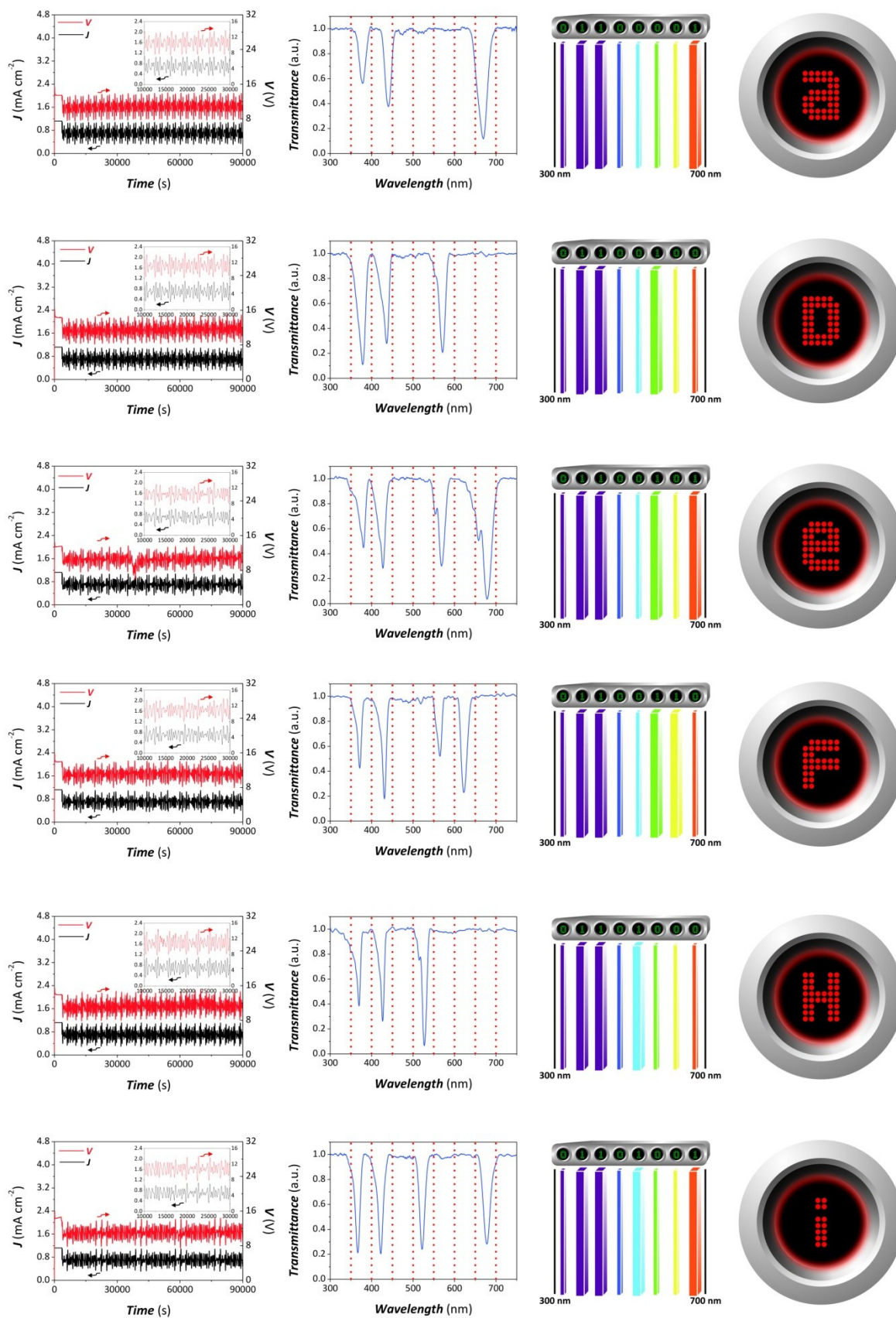


Figure S3 (Cont.)

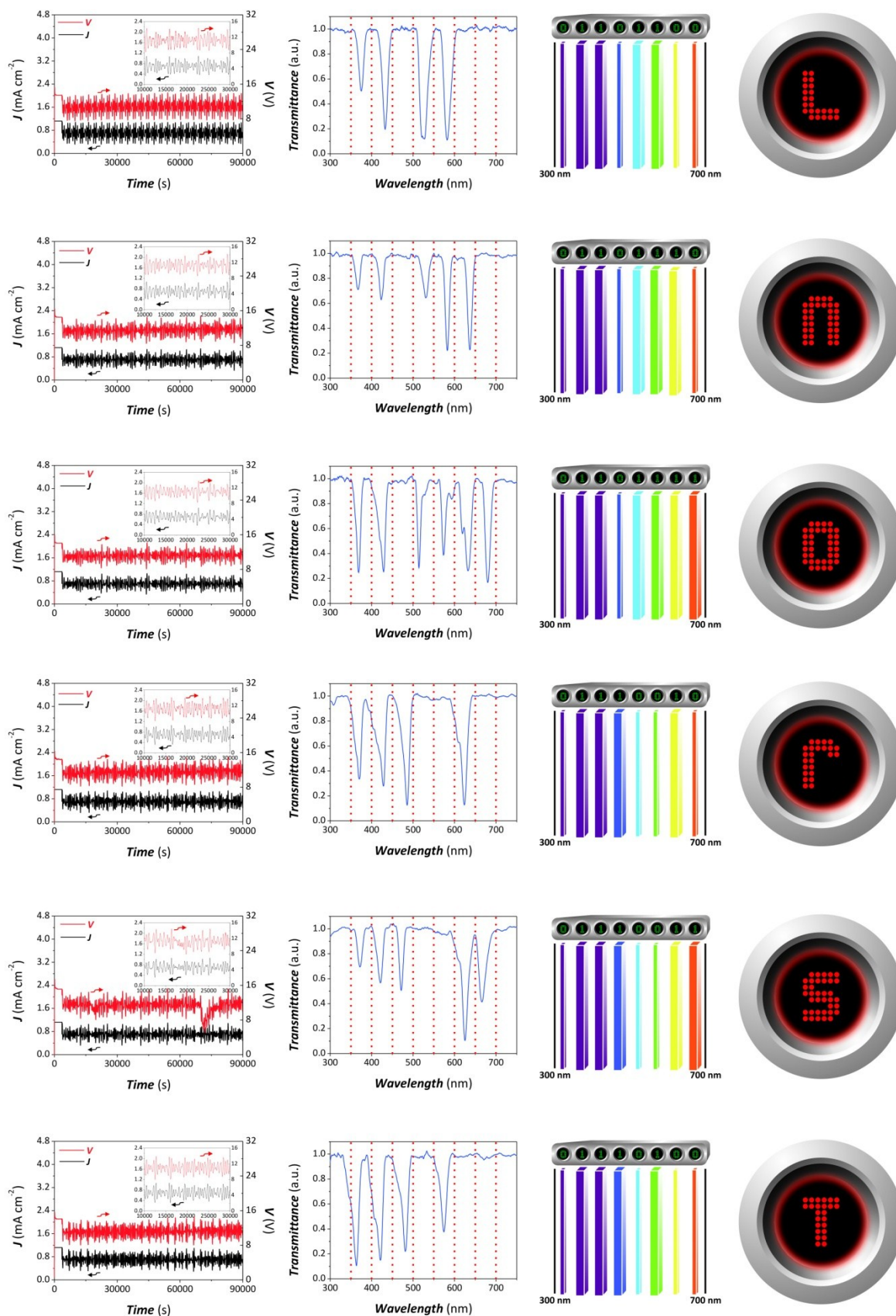
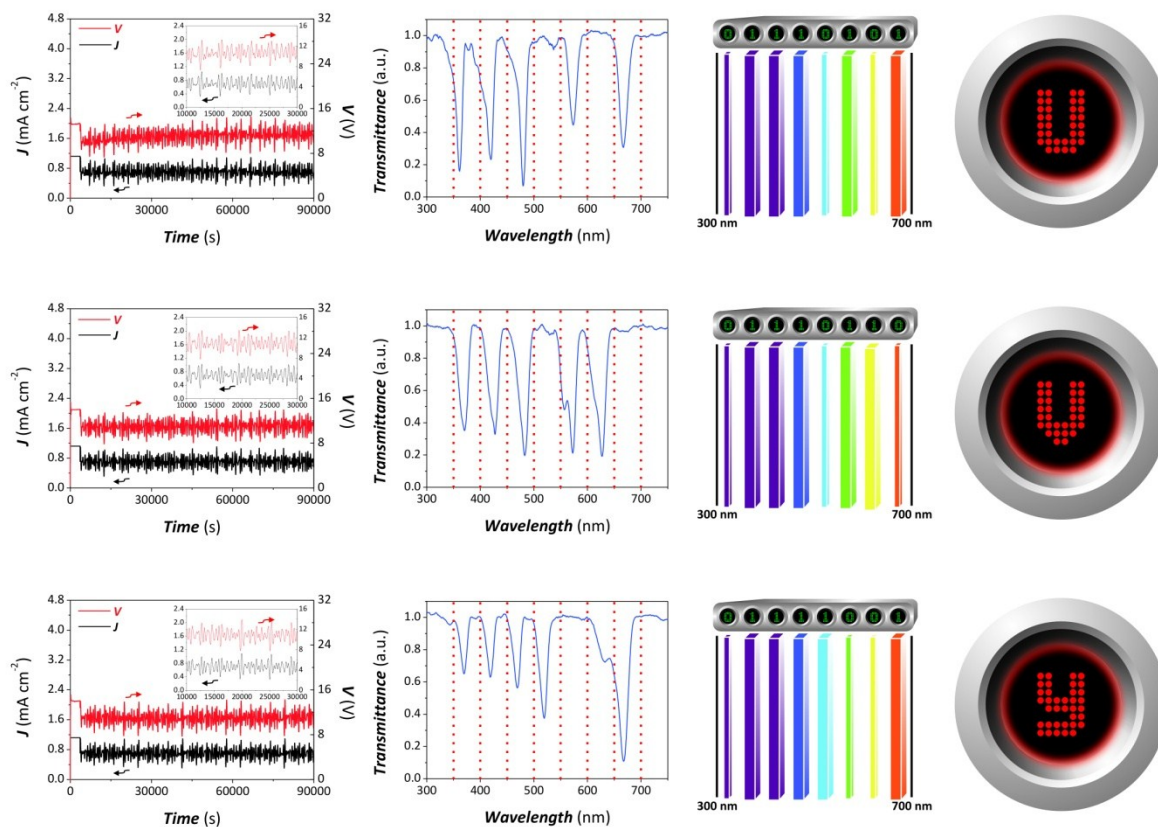


Figure S3 (Cont.)



**Table S1**

| <b>Character</b> | <b>ASCII Code (8 bit)</b> | <b>Raw Sinusoidal Waves ON <math>T_p</math> (s)</b> | <b>Interferometric Colour</b> |
|------------------|---------------------------|-----------------------------------------------------|-------------------------------|
| <i>t</i>         | 1110100                   | 450, 525, 600 and 750s                              | Green                         |
| <i>h</i>         | 1101000                   | 450, 525 and 675s                                   | Blue                          |
| <i>e</i>         | 1100101                   | 450, 525, 750 and 900s                              | Yellow                        |
| <i>u</i>         | 1110101                   | 450, 525, 600, 750 and 900s                         | Purple                        |
| <i>n</i>         | 1101110                   | 450, 525, 675, 750 and 825s                         | Green                         |
| <i>i</i>         | 1101001                   | 450, 525, 675 and 900s                              | Purple                        |
| <i>v</i>         | 1110110                   | 450, 525, 600, 750 and 825s                         | Green                         |
| <i>r</i>         | 1110010                   | 450, 525, 600 and 825s                              | Purple                        |
| <i>s</i>         | 1110011                   | 450, 525, 600, 825 and 900s                         | Orange                        |
| <i>y</i>         | 1111001                   | 450, 525, 600, 650 and 900s                         | Purple                        |
| <i>o</i>         | 1101111                   | 450, 525, 675, 750, 825 and 900s                    | Dark Yellow                   |
| <i>f</i>         | 1100110                   | 450, 525, 750 and 825s                              | Orange                        |
| <i>a</i>         | 1100001                   | 450, 525 and 900s                                   | Red                           |
| <i>d</i>         | 1100100                   | 450, 525 and 750s                                   | Chartreuse                    |
| <i>l</i>         | 1101100                   | 450, 525, 675 and 750s                              | Cyan                          |