

## Supplementary Information

### **Green processing by surface diffuse atmospheric plasma to enhance dyeing performance on polylactic acid fabric**

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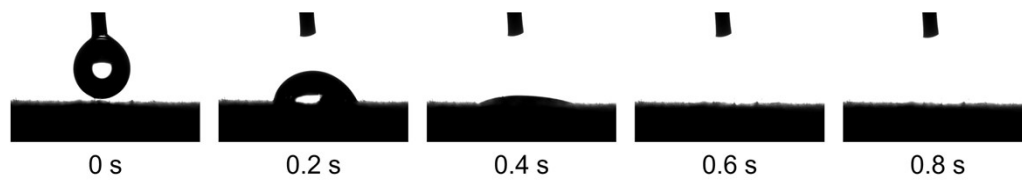
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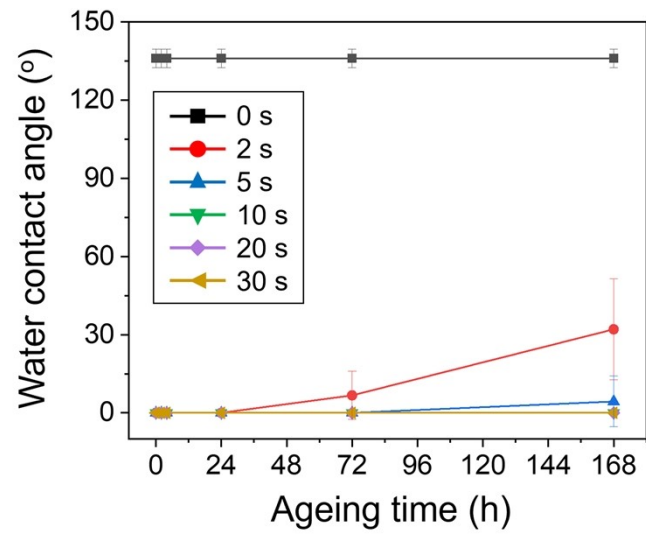
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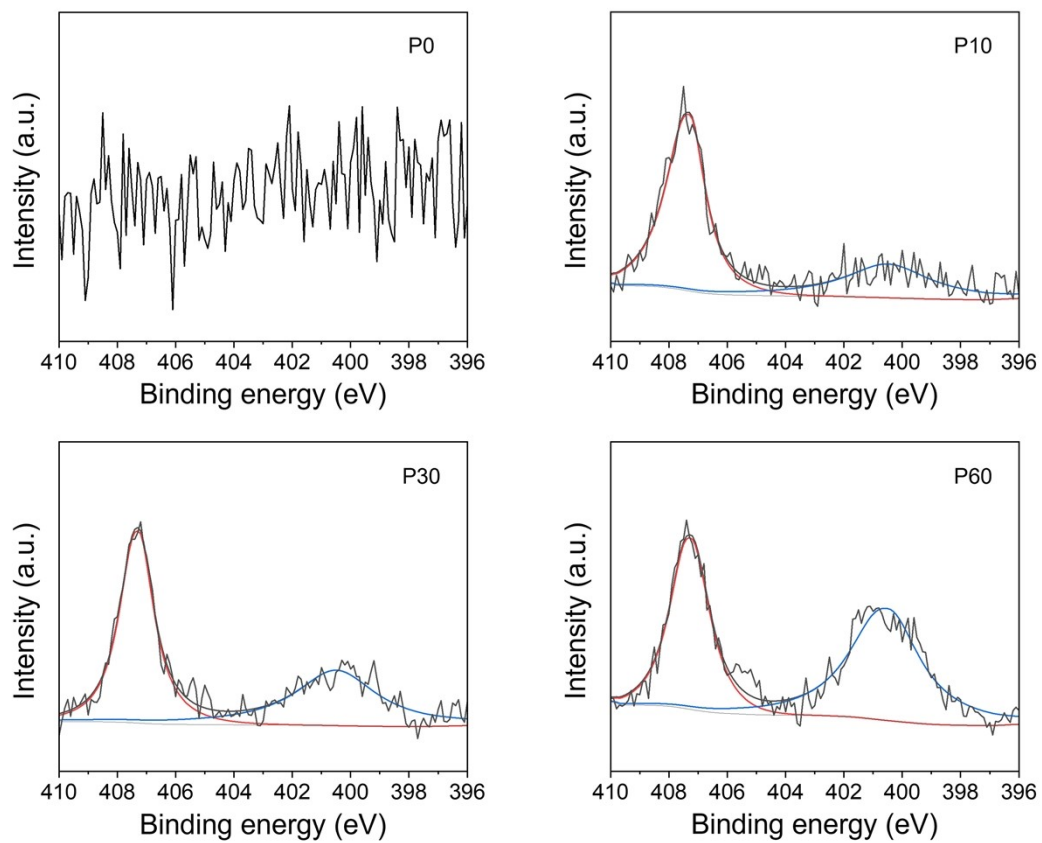
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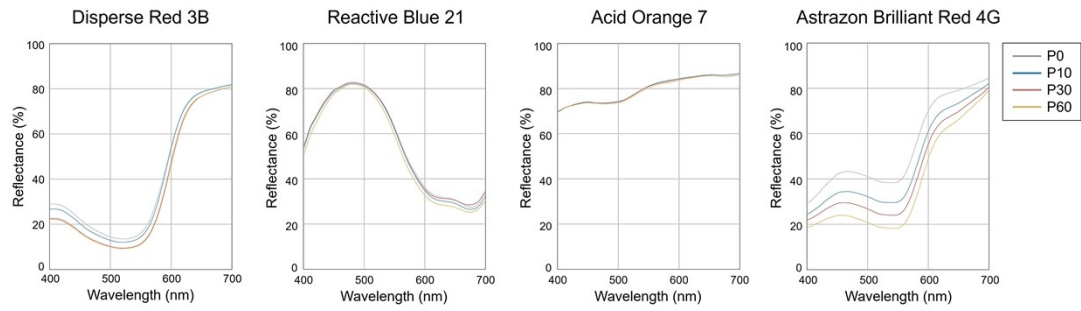
**Fig. S1** The process of water droplet spreading and absorbing on the surface of PLA fibers after SDAP treatment for 2 seconds.



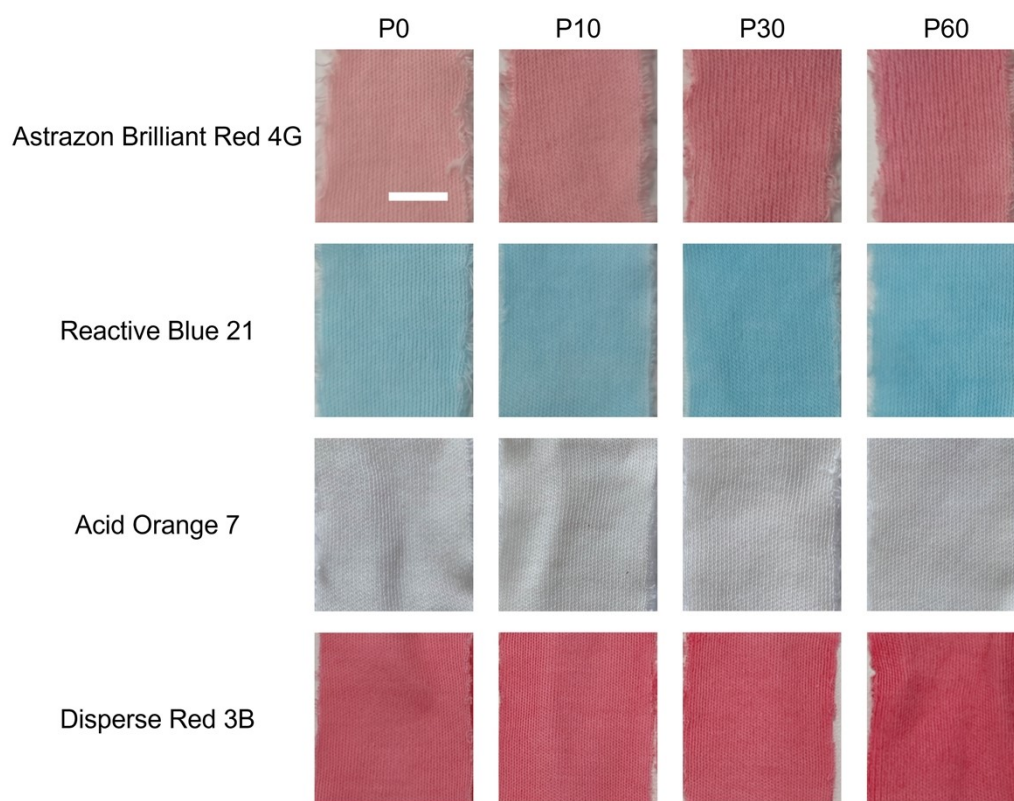
**Fig. S2** The ageing process of plasma modified PLA fibers. Plasma modified PLA fibers could maintain hydrophilic when stored in air for 7 days.



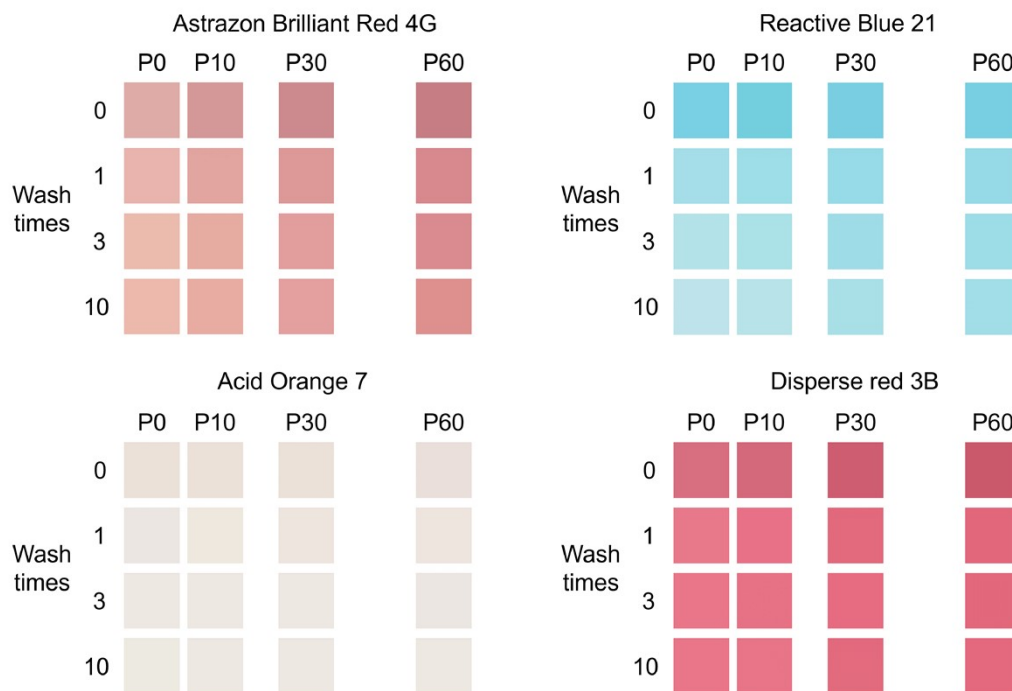
**Fig. S3** XPS spectra and peak-fitted high-resolution N 1s spectra of PLA fibers when the plasma processing time was 0, 10, 30, 60 seconds (P0, P10, P30, P60, respectively). The nitrogen-containing species on PLA fibers surface gradually appeared and increased with the increase of plasma processing time.



**Fig. S4** The reflectance in visible spectrum range of the PLA fibers dyed by four kinds of dye after different time of plasma treatment without soap washing. P0, P10, P30, P60 refers to the plasma treatment for 0, 10, 30, 60 seconds, respectively.

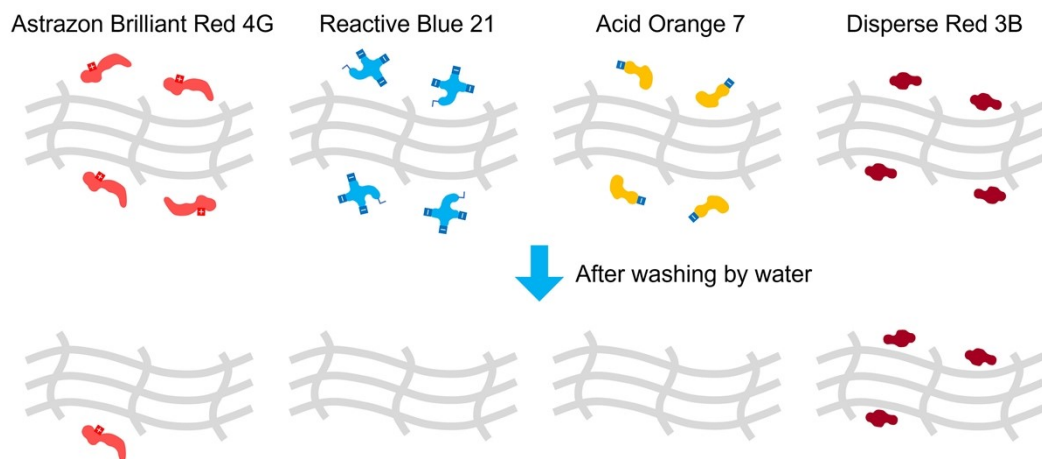


**Fig. S5** The actual dyeing images of PLA fibers after different time of plasma treatment for four kinds of dye. P0, P10, P30, P60 refers to the plasma treatment for 0, 10, 30, 60 seconds, respectively. Scale bar, 1 cm.



**Fig. S6** The specific color strength block of PLA fibers dyed by four kinds of dye at different plasma processing time after soap washing for different times, corresponding to each point in Fig. 4a-d, respectively. P0, P10, P30, P60 refers to the plasma treatment for 0, 10, 30, 60 seconds, respectively.





**Fig. S7** The schematic diagram of the binding between original PLA fibers and the four kinds of dye.