Electronic Supplementary Material (ESI) for Nanoscale.

ELECTRONIC SUPPLEMENTRY INFORMATION

Whispering Gallery Mode Emission from Dye-Doped Polymer Fiber Cross-sections Fabricated by Near-Field Electrospinning

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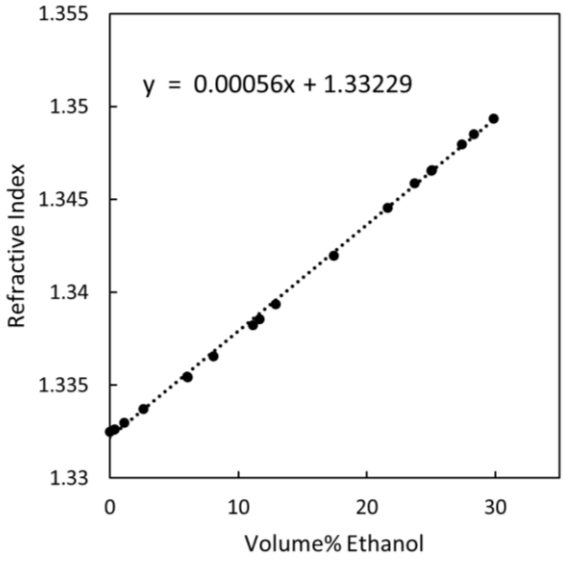

Volume% EtOH	Refractive Index
29.84	1.3494
28.31	1.3485
27.39	1.3480
25.01	1.3466
25.04	1.3466
23.67	1.3459
21.60	1.3446
17.40	1.3420
12.90	1.3394
11.61	1.3386
11.10	1.3383
8.05	1.3366
6.01	1.3355
6.04	1.3355
2.58	1.3337
1.09	1.3330
0.34	1.3327
0.00	1.3325

Figure S1: A plot of data and table of values which were obtained from Scott et al[1], and used to calculate the refractive indices of ethanol-water solutions used for sensing experiments.

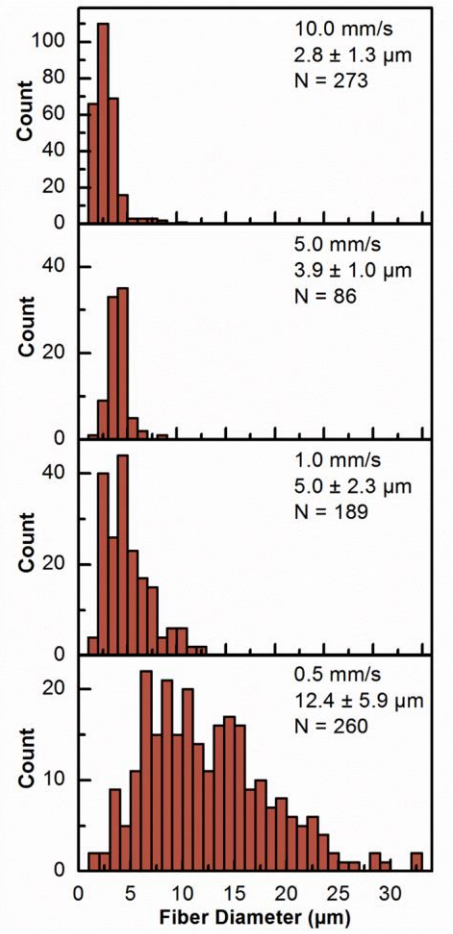

Figure S2: Histograms of 0.0035 gR6G/gPVA fiber size electrospun using stage speeds of 10.0 mm/s, 5.0 mm/s, 1.0 mm/s, and 0.5 mm/s.

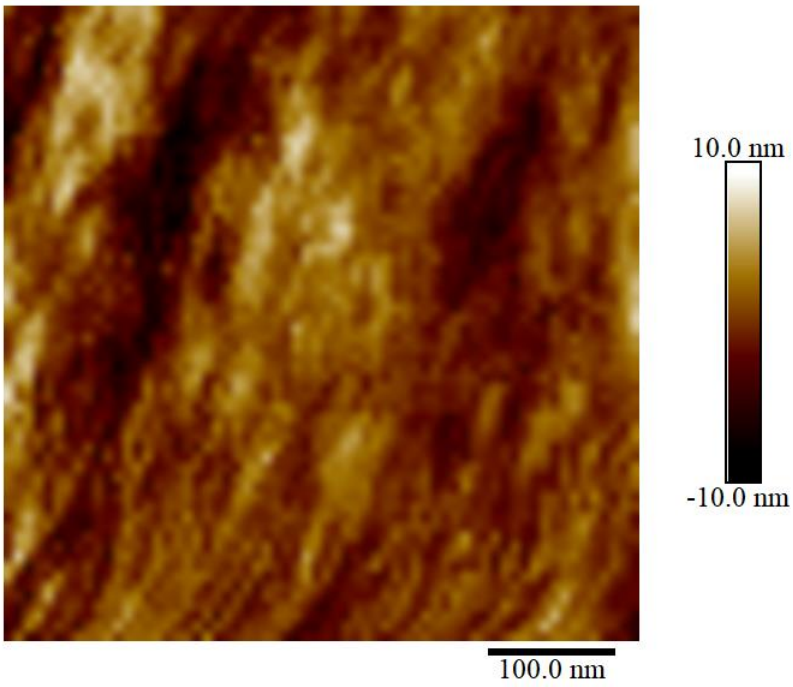

Figure S3: AFM image of the surface of a dye-doped PVA fiber electrospun with a stage speed of 0.5 mm s^{-1} and a R6G/PVA mass ratio of 0.0035. The measured root-mean-squared roughness was 2.4 nm.

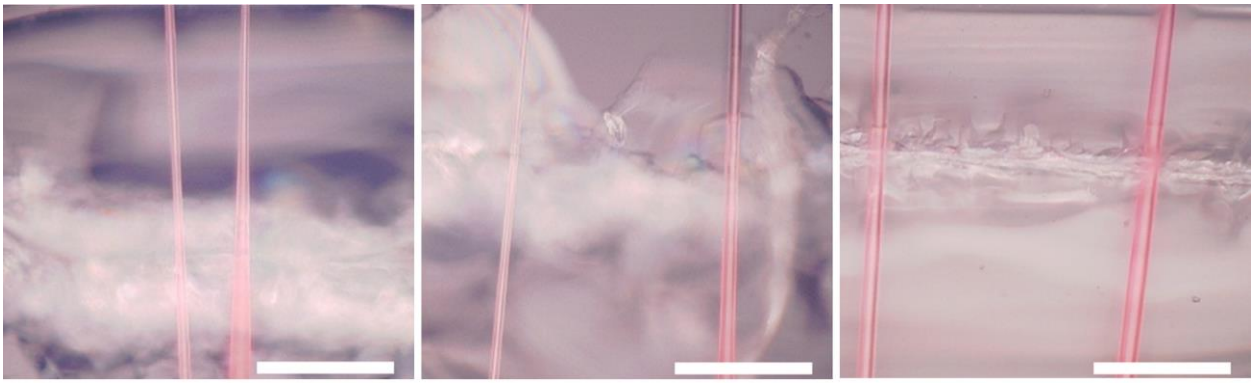

Figure S4: Optical microscopy images illustrating the range and degree of diameter variation observed in dye-doped, electrospun PVA fibers on a glass substrate. Background depicts the scribed trench over which the fibers were suspended. Scale bar: 100 μm.

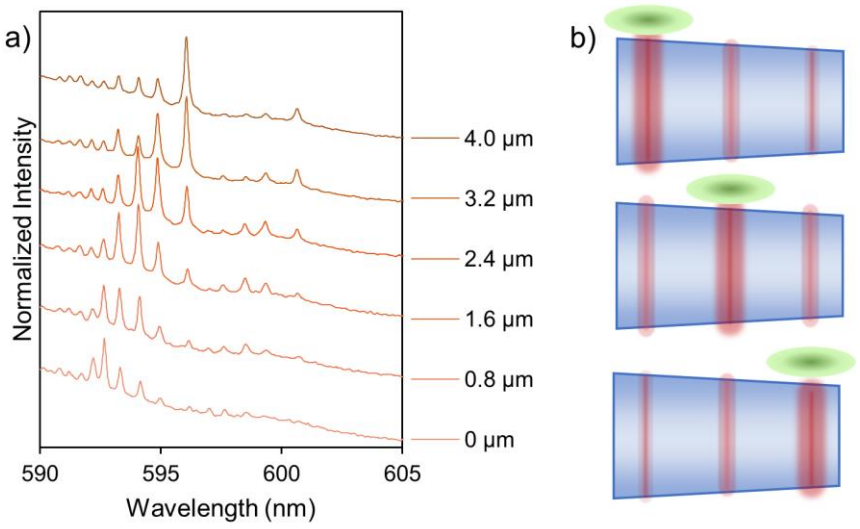

Figure S5: a) Spectra taken at 0.8 μm increments along the length of a 4.2 μm diameter fiber. b) A schematic representation of spectral measurements at three different axial positions along the length of the fiber.

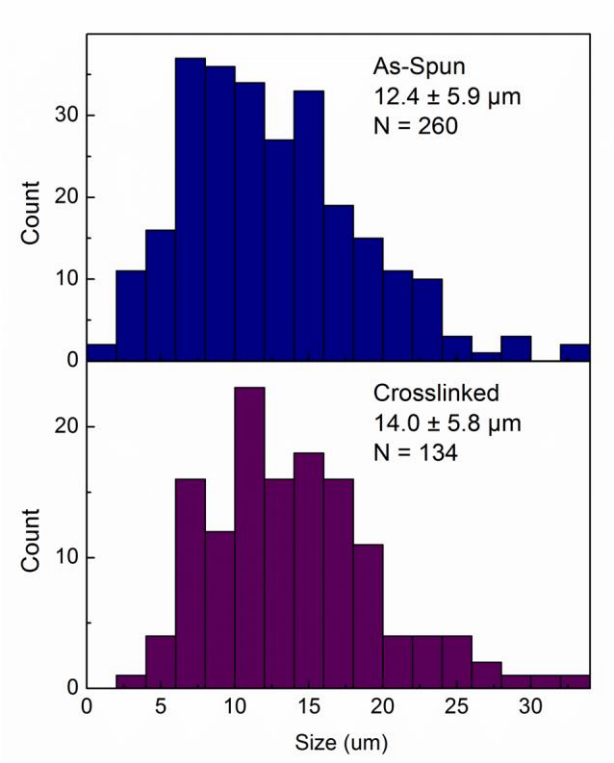

Figure S6: Histogram of as-spun and crosslinked R6G-PVA fiber size electrospun using a stage speed of 0.5 mm/s. A small increase in fiber diameter was caused by glutaraldehyde crosslinking treatment.

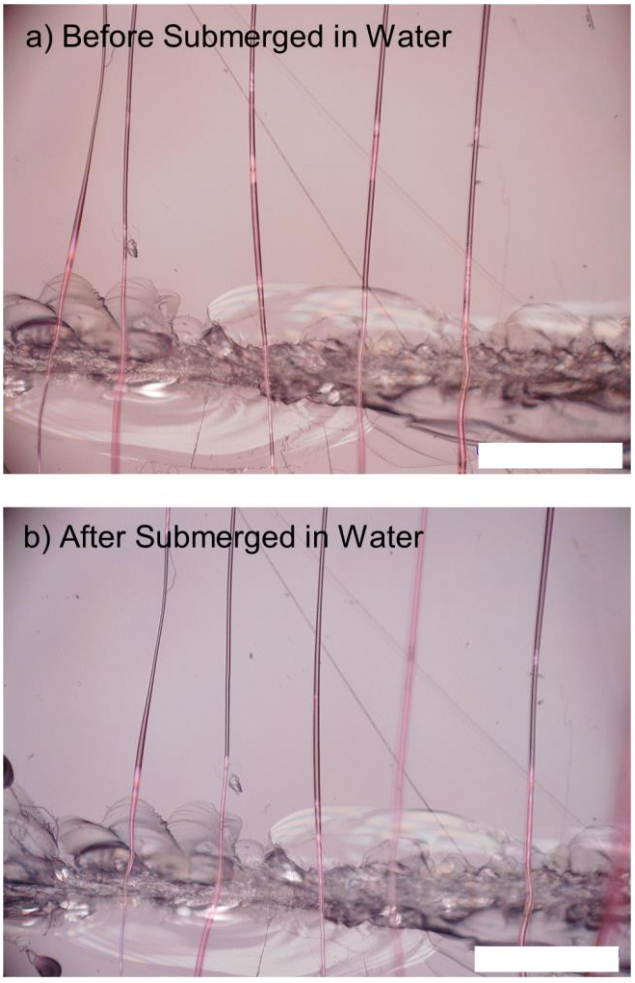

Figure S7: Optical images of crosslinked R6G-PVA fibers a) before and b) after immersion in water for 24 h. The fibers were water stable. Scale bar: 200 µm.

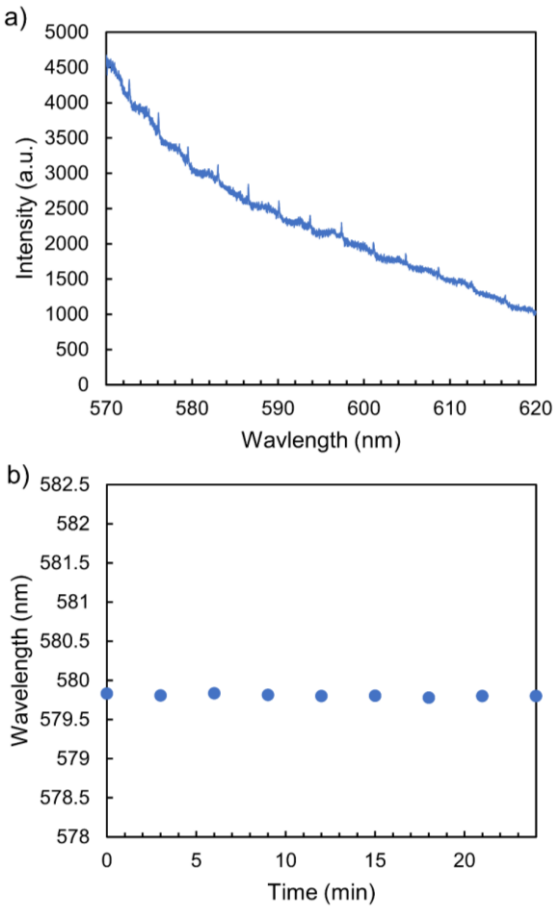

Figure S8: a) Representative fluorescence spectrum of a crosslinked R6G-PVA fiber in water. The spectrum was taken with a 50x long working distance objective under 532 nm CW illumination, using conditions similar to ethanol-water chemical sensing. The shutter was closed between measurements. b) The peak wavelength as a function of measurement time for mode near 580 nm. WGM resonance wavelength remains stable over time.

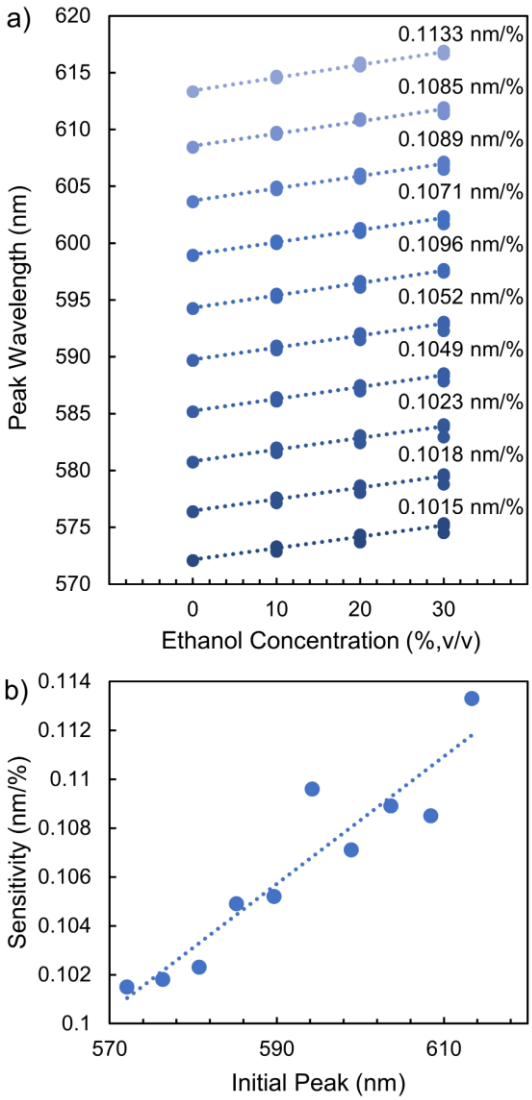

Figure S9: a) Peak emission wavelength as a function of ethanol concentration for the same 15.9 µm fiber shown in Figure 7. b) Plot of sensitivity versus wavelength for each resonance peak. Sensor sensitivity increases for longer wavelength.

(1) Scott, T. A. Refractive Index of Ethanol-Water Mixtures and Density and Refractive Index of Ethanol-Water-Ethyl Ether Mixtures. *J. Phys. Chem.* **1946**, *50* (5), 406–412. https://doi.org/10.1021/j150449a003.