Supporting Information

for

Electrospun Rhodamine@MOF/Polymer Luminescent Fibers
with a Quantum Yield of Over 90%

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Figure S1. SEM images of electrospun PVDF fibers incorporating RhB@ZIF-71 micron-sized crystals obtained from the conventional method (non-HCR) (Zhang et al., 2020), related to Figure 2.
Figure S2. SEM images and sampling to determine the diameters of 1 wt% RhB@ZIF-71/PVDF fibers prepared under 8 μL/min flow rate in electrospinning, related to Figure 4.

| Position | Diameter (nm) |
|----------|---------------|
| 1        | 1276          |
| 2        | 1392          |
| 3        | 1295          |
| 4        | 1210          |
| 5        | 908           |
| 6        | 1100          |
| 7        | 1347          |
| 8        | 1354          |
| 9        | 1335          |
| 10       | 710           |
| Avg.     | 1319          |

| Position | Diameter (nm) |
|----------|---------------|
| 1        | 913           |
| 2        | 940           |
| 3        | 957           |
| 4        | 1320          |
| 5        | 1367          |
| 6        | 1056          |
| 7        | 1097          |
| 8        | 1337          |
| 9        | 1338          |
| 10       | 807           |
| Avg.     | 1098          |

| Position | Diameter (nm) |
|----------|---------------|
| 1        | 1142          |
| 2        | 1137          |
| 3        | 853           |
| 4        | 1057          |
| 5        | 700           |
| 6        | 1007          |
| 7        | 1058          |
| 8        | 1378          |
| 9        | 987           |
| 10       | 1023          |
| Avg.     | 1004          |
Figure S3. SEM images and sampling to determine the diameter of 1 wt% RhB@ZIF-71/PVDF fibers prepared under 12 μL/min flow rate in electrospinning, related to Figure 4.
Figure S4. SEM images and sampling to determine the diameters of 1 wt% RhB@ZIF-71/PVDF fibers prepared under 20 μL/min flow rate in electrospinning, related to Figure 4.
Figure S5. Excitation and emission spectra of RhB/PVDF fibers and RhB@ZIF-71/PVDF fibers, related to Figure 6.
(A) excitation spectra
(B) emission spectra
Figure S6. Peak intensity changing during heat treatment of 1 wt% RhB@ZIF-71/PVDF fibers, and RhB/PVDF fibers at different temperatures, related to Figure 6.
Figure S7. Characterization of PVDF and RhB@ZIF-71/PVDF fibers at temperatures close to the $T_m$ of PVDF, related to Figure 6.

Melting temperature ($T_m$) of PVDF and RhB@ZIF-71/PVDF fibers with different loading wt.%. Excitation and emission changing during heat treatment of RhB@ZIF-71/PVDF fibers at temperatures close to the $T_m$ of PVDF.
Figure S8. Emission property of RhB@ZIF-71/PVDF fibers after repeated heating, related to Figure 6.
Emission spectra of RhB@ZIF-71/PVDF fibers (1 wt%, 8 μL/min) determined at room temperature (RT) after being subjected to repeated heating tests to 200 °C (denoted by the cycle number, RhB/PVDF fiber is shown for contrast)
Figure S9. Absorption spectra of RhB and RhB@ZIF-71 in an acetone solution, related to STAR Methods.
Table S1. Lifetime results of RhB@ZIF-71 nanocrystals (powder sample) and its PVDF fiber composite with different weight percentage, related to Figure 5.

Values of time constants ($\tau_i$), normalised pre-exponential factors ($a_i$), and fractional contributions ($c_i = \tau_i \cdot a_i$) of the emission decay of RhB@ZIF-71 nanocrystals (powder sample) and its PVDF fiber composite with different weight percentage upon excitation at 362.5 nm ($R_t = \Sigma a_i e^{(-t/\tau_i)}$, $R_t$ is the quantity/counts at time $t$).

| Sample    | $\lambda_{obs}$ [nm] | $\tau_1$ [ns] | $a_1$ [%] | $c_1$ [%] | $\tau_2$ [ns] | $a_2$ [%] | $c_2$ [%] | $\tau_3$ [ns] | $a_3$ [%] | $c_3$ [%] | $X^2$ |
|-----------|----------------------|---------------|-----------|-----------|---------------|-----------|-----------|---------------|-----------|-----------|-------|
| Powder    | 579                  | 0.60          | 19.7      | 5.21      | 2.15          | 54.5      | 50.66     | 4.00          | 25.8      | 44.13     | 1.060 |
|           | 599                  | 0.60          | 3.3       | 0.86      | 2.15          | 55.7      | 41.84     | 4.00          | 41.0      | 57.30     | 1.115 |
|           | 619                  | 0.60          | 8.3       | 1.75      | 2.15          | 36.7      | 25.88     | 4.00          | 55.0      | 72.37     | 1.133 |
| 1 wt% Fiber | 559                 | 0.80          | 25.4      | 7.33      | 2.80          | 47.6      | 49.31     | 4.50          | 27.0      | 43.36     | 1.017 |
| 8 \(\mu\)L/min | 579                 | 0.80          | 15.3      | 4.23      | 2.80          | 55.9      | 52.85     | 4.50          | 28.8      | 42.92     | 1.002 |
|           | 599                  | 0.80          | 5.4       | 1.20      | 2.80          | 60.7      | 52.12     | 4.50          | 33.9      | 46.68     | 1.087 |
| 3 wt% Fiber | 561                 | 0.80          | 31.8      | 10.76     | 2.66          | 54.5      | 62.96     | 4.50          | 13.6      | 26.28     | 1.086 |
| 8 \(\mu\)L/min | 581                 | 0.80          | 19.4      | 6.02      | 2.66          | 66.1      | 68.09     | 4.50          | 14.5      | 25.89     | 1.046 |
|           | 601                  | 0.80          | 8.6       | 2.40      | 2.66          | 74.1      | 69.38     | 4.50          | 17.2      | 28.22     | 1.097 |
| 5 wt% Fiber | 567                 | 0.80          | 26.2      | 8.41      | 2.54          | 53.8      | 55.89     | 4.50          | 20.0      | 35.70     | 1.025 |
| 8 \(\mu\)L/min | 587                 | 0.80          | 16.4      | 4.82      | 2.54          | 62.3      | 58.28     | 4.50          | 21.3      | 36.90     | 1.006 |
|           | 607                  | 0.80          | 5.2       | 1.43      | 2.54          | 67.2      | 56.87     | 4.50          | 27.6      | 41.70     | 1.133 |
Table S2. Lifetime results of RhB@ZIF-71 nanocrystals (powder sample) and its PVDF fiber composite with different processing speed, related to Figure 5.
Values of time constants ($\tau_i$), normalised pre-exponential factors ($a_i$), and fractional contributions ($c_i = \tau_i \cdot a_i$) of the emission decay of RhB@ZIF-71 nanocrystals (powder sample) and its PVDF fiber composite with different processing speed upon excitation at 362.5 nm.

| Sample       | $\lambda_{obs}$ [nm] | $\tau_1$ [ns] | $a_1$ [%] | $c_1$ [%] | $\tau_2$ [ns] | $a_2$ [%] | $c_2$ [%] | $\tau_3$ [ns] | $a_3$ [%] | $c_3$ [%] | $\chi^2$ |
|--------------|----------------------|---------------|-----------|-----------|---------------|-----------|-----------|---------------|-----------|-----------|----------|
| Powder       |                      |               |           |           |               |           |           |               |           |           |          |
|              | 579                  | 0.60          | 19.7      | 5.21      | 2.15          | 54.5      | 50.66     | 4.00          | 25.8      | 44.13     | 1.060    |
|              | 599                  | 0.60          | 3.3       | 0.86      | 2.15          | 55.7      | 41.84     | 4.00          | 41.0      | 57.30     | 1.115    |
|              | 619                  | 0.60          | 8.3       | 1.75      | 2.15          | 36.7      | 25.88     | 4.00          | 55.0      | 72.37     | 1.133    |
| 1 wt% 8 µL/min Fiber | 559                  | 0.80          | 25.4      | 7.33      | 2.80          | 47.6      | 49.31     | 4.50          | 27.0      | 43.36     | 1.017    |
|              | 579                  | 0.80          | 15.3      | 4.23      | 2.80          | 55.9      | 52.85     | 4.50          | 28.8      | 42.92     | 1.002    |
|              | 599                  | 0.80          | 5.4       | 1.20      | 2.80          | 60.7      | 52.12     | 4.50          | 33.9      | 46.68     | 1.087    |
| 1 wt% 12 µL/min Fiber | 564                  | 0.80          | 22.6      | 6.48      | 2.63          | 51.6      | 50.07     | 4.50          | 25.8      | 43.45     | 1.055    |
|              | 584                  | 0.80          | 15.0      | 4.03      | 2.63          | 56.7      | 51.49     | 4.50          | 28.3      | 44.47     | 1.171    |
|              | 604                  | 0.80          | 13.8      | 3.44      | 2.63          | 51.7      | 45.42     | 4.50          | 34.5      | 51.14     | 1.288    |
| 1 wt% 20 µL/min Fiber | 566                  | 0.80          | 5.3       | 1.64      | 2.55          | 68.4      | 58.16     | 4.50          | 26.3      | 40.20     | 1.119    |
|              | 586                  | 0.80          | 3.4       | 1.05      | 2.55          | 69.0      | 58.34     | 4.50          | 27.6      | 40.61     | 1.046    |
|              | 606                  | 0.80          | 0.0       | 0.21      | 2.55          | 69.1      | 55.05     | 4.50          | 30.9      | 44.74     | 1.212    |
Table S3. The quantum yield of RhB@ZIF-71 powder and its PVDF fiber with different weight percentage, related to Figure 5.

The standard deviation corresponds to 3 measurements.

| Sample          | QY (%)                      |
|-----------------|-----------------------------|
|                 | Ex@485 nm | Ex@520 nm | Ex@525 nm |
| Powder          | 24.83±0.07 | 27.21±0.34 | 23.76±0.19 |
| 1 wt% 8 μL/min  | 92.11±0.51 | 70.35±0.07 | 66.17±0.14 |
| 3 wt% 8 μL/min  | 51.12±0.11 | 58.76±0.06 | 58.50±0.79 |
| 5 wt% 8 μL/min  | 57.80±0.40 | 53.46±0.08 | 49.98±0.07 |
Table S4. The quantum yield of RhB@ZIF-71 powder and its PVDF fiber with different processing speed, related to Figure 5.
The standard deviation corresponds to 3 measurements.

| Sample                     | QY (%)    |
|----------------------------|-----------|
|                            | Ex@485 nm | Ex@520 nm | Ex@525 nm |
| Powder                     | 24.83±0.07| 27.21±0.34| 23.76±0.19|
| 1 wt% 8 μL/min             | 92.11±0.51| 70.35±0.07| 66.17±0.14|
| 1 wt% 12 μL/min            | 70.37±0.10| 65.81±0.13| 64.86±0.06|
| 1 wt% 20 μL/min            | 75.86±0.10| 66.84±0.13| 63.40±0.07|
Table S5. The quantum yield (QY) of other RhB-based fluorescent materials in the literature compared with the results of the current study, related to Figure 5.
The standard deviation for the RhB@ZIF-71/PVDF electrospun fibers was determined from 3 measurements.

| System                                    | QY (%)          | Ref                                      |
|-------------------------------------------|-----------------|------------------------------------------|
| RhB/PVAc; RhB/PMMA                        | 3.22 – 25.2     | (Ahmed and Saif, 2013)                   |
| RhB@AuNP                                  | 1               | (Stobiecka and Hepel, 2011)              |
| RhB/sol-gel silica                        | 37.4            | (Khader, 2008)                           |
| RhB solutions                             | 30 – 66         | (Sagoo and Jockusch, 2011)               |
| RhB@ZIF-71/PVDF electrospun fibers        | 92 ± 0.5        | This work                                |
| 1wt%, 8μL/min                              |                 |                                          |