Electronic Supplementary Information

Research on the influence of polar solvents on CsPbBr$_3$ Perovskite

QDs

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Starting materials

Cesium carbonate (99.9%), oleic acid (≥99%), 1-octadecene (90%), oleylamine (≥98%), lead bromide (99.999%) were purchased from Sigma-Aldrich. ethyl acetate (≥99.9%), n-Butyl acetate (≥99%), dibutyl phthalate (≥99%) were purchased from Aladdin. Toluene (≥95%), hexane (≥95%), methanol (≥99.5%), ethanol (≥99.7%), isopropanol (≥99.7%), 1-butanol (≥99%), 1-pentanol (≥95%), 1-octanol (≥99%), N,N-dimethylformamide (≥99.5%), acetone (≥99.5%), and tetramethylethylenediamine (≥99%) were purchased from Beijing Chemical Works. All the reagents were used without further purification.

Experiment

Dissolved 50µl PQDs with a concentration of 21mg/ml in 6ml n-hexane solution and set it as sample A, the solution added 50 µl acetone additionally was set as sample B1, added ethyl acetate, n-Butyl acetate, dibutyl phthalate separately were set as B2-B4, added 50 µl TMEDA in sample A, were set as sample B5, successively, added 50 µl DMF, set as sample B6, added methanol, ethanol, isopropanol, 1-butanol, 1-pentanol, 1-octanol to the sample A solution, and set them as sample B7-B12 in turn. Shaked sample A and Bx(x=1-12) together evenly with a ball machine, and let them stand for 30 minutes finally.
Table 1. Permittivity of polar solvents

| Solvent            | DMF  | methanol | ethanol | acetone | isopropanol | 1-butanol |
|--------------------|------|----------|---------|---------|-------------|-----------|
| Permittivity (C²/(N·M²)) | 36.7 | 32.5     | 24.3    | 20.7    | 18.3        | 17.1      |
| 1-pentanol         | 13.9 | 10.34    | 6.02    | 5.01    | 6.436       |           |
| 1-octanol          |      |          |         |         |             |           |
| Ethyl acetate      |      |          |         |         |             |           |
| n-Butyl acetate    |      |          |         |         |             |           |
| dibutyl phthalate  |      |          |         |         |             |           |

Table 2. The peak wavelength of sample A and sample B7-B12.

| Sample | peak wavelength (nm) |
|--------|----------------------|
| A      | 517.6                |
| B7     | 521                  |
| B8     | 519                  |
| B9     | 518.8                |
| B10    | 518.4                |
| B11    | 518.6                |
| B12    | 517.2                |

Figure S1. Photograph of the sample A and sample B2-B4 under UV light.

Figure S2. The FE-SEM images of PQDs after reacting with B2-B4.
Figure S3. The absorption and PL spectras of sample B2-B4.
Figure S4. The PLQY of PQDs after adding hexyl hydride, DMF, acetone, methanol, ethanol, isopropanol, 1-butanol, 1-pentanol, octanol, ethyl acetate, n-Butyl acetate, dibutyl phthalate.
Figure S5. The EDS diagrams of hexyl hydride (blue) and TMEDA (pink).
Figure S6. The absorption spectra of PQDs after reacting with alcohols.
Table 3. After added different polar solvents, the changes of structural and optical properties of the PQDs.