

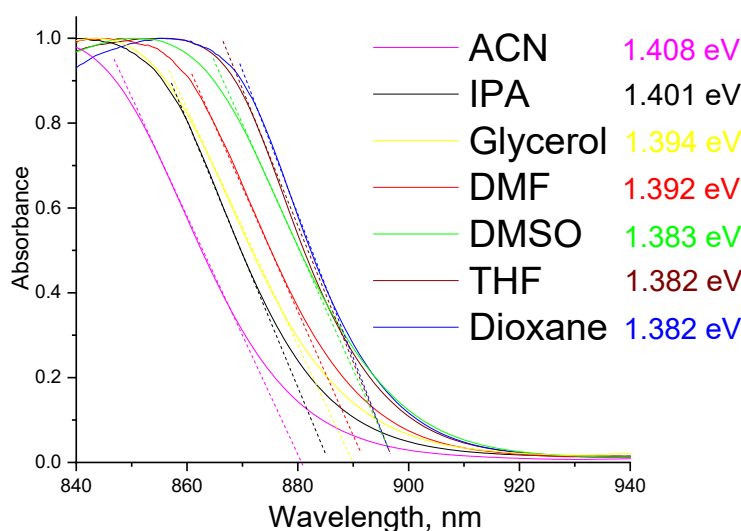
SUPPLEMENTARY MATERIAL

Impact of Thermal Properties of the Environment on the Hot-Band Absorption-Assisted Single-Photon Upconversion

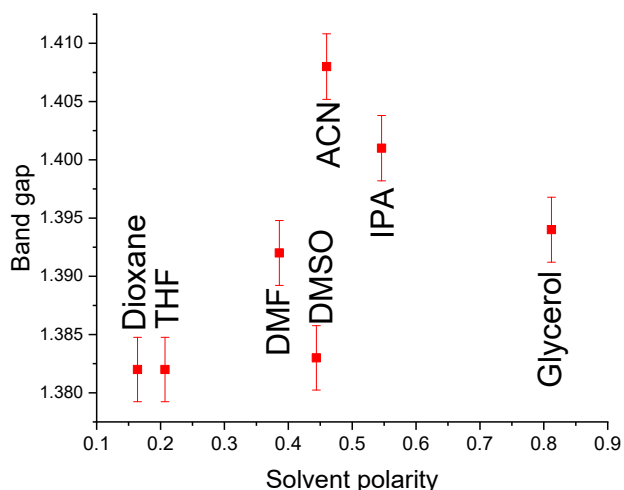
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a



b

Fig. S1. (a) Low-energy edge of the normalized absorption band of the dye solutions. Calculated bandgaps for the different solvents are indicated; (b) Dye bandgap as a function of the solvent polarity.

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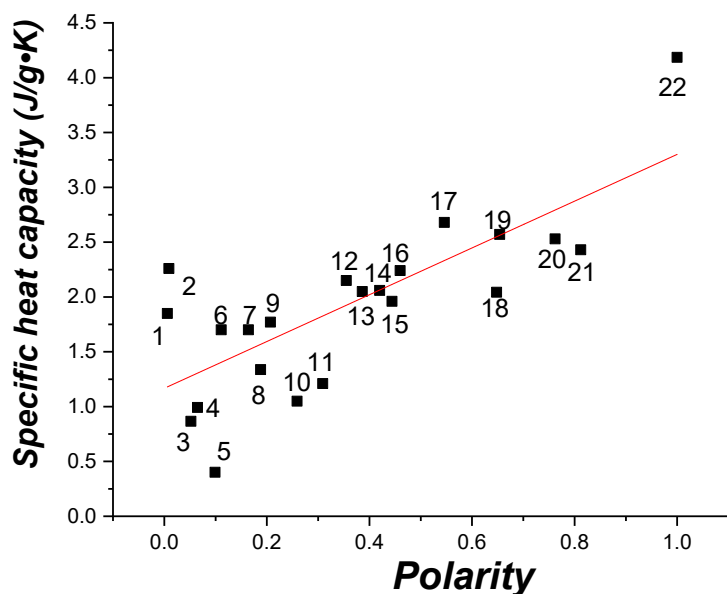


Fig. S2. Dependence of SHC on solvent polarity for 22 different solvents: 1- cyclohexane, 2- hexane, 3- carbon tetrachloride, 4- carbon disulfide, 5- toluene, 6- benzene, 7- dioxane, 8- chlorobenzene, 9- THF, 10- chloroform, 11- methylene chloride, 12- acetone, 13- DMF, 14- aniline, 15- DMSO, 16- acetonitrile, 17- IPA, 18- acetic acid, 19- ethanol, 20- methanol, 21- glycerine, 22- water.

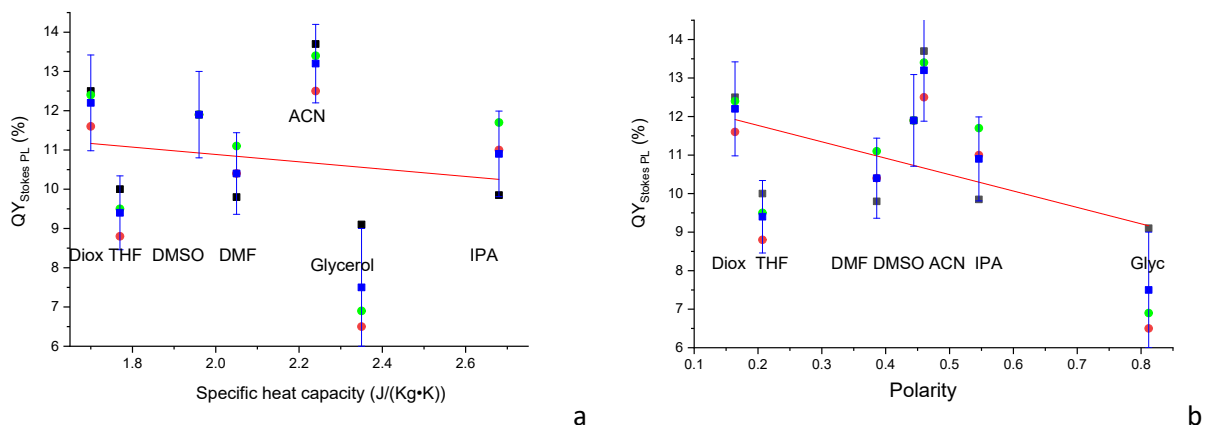
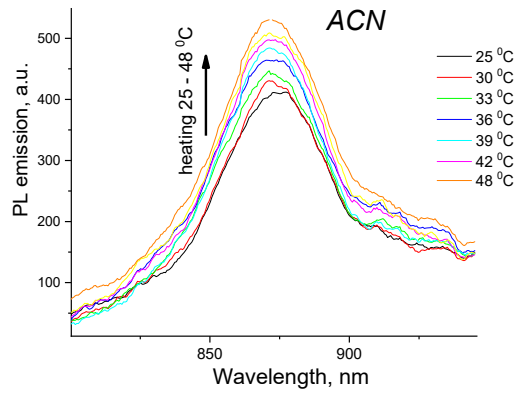
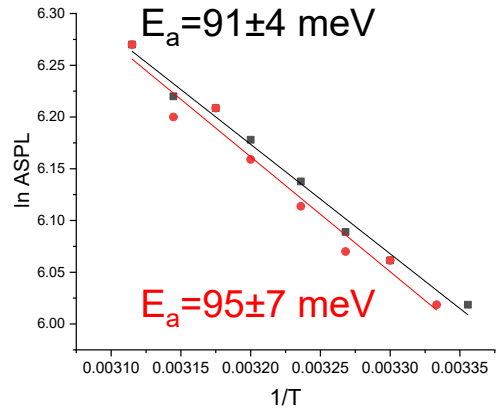


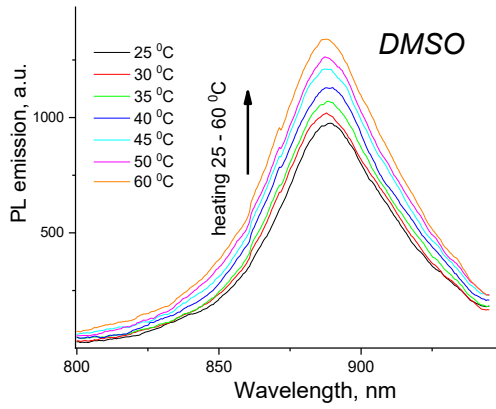
Fig. S3. QY of the Stokes emission ($\lambda_{exc}=780$ nm) as a function of (a) specific heat capacity and (b) polarity of the solvents used. Variation of QY in different set of experiments, shown by black, red, and blue symbols, allowed us to establish the accuracy of about 20%. The linear fit with the slope close to unity indicates that QY of the Stokes emission is slightly dependent of the solvent specific heat capacity.



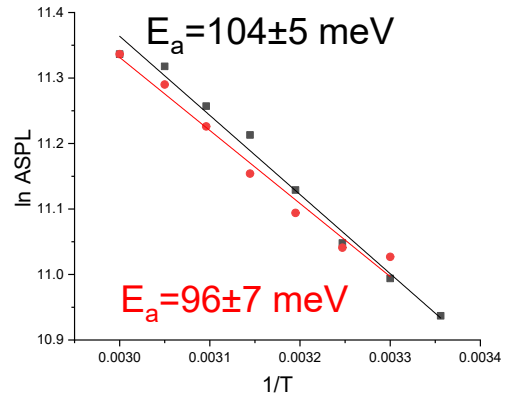
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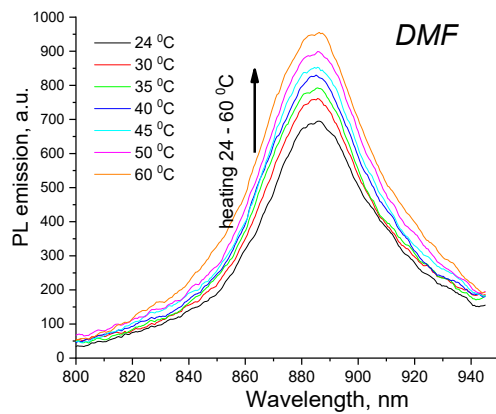
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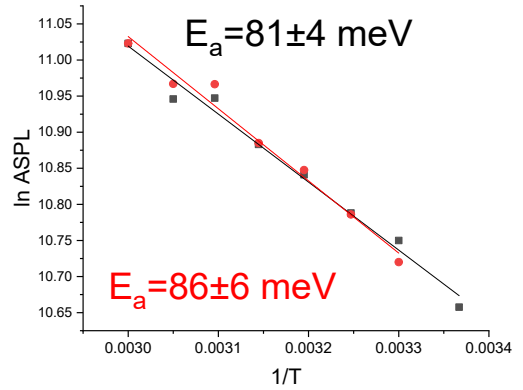
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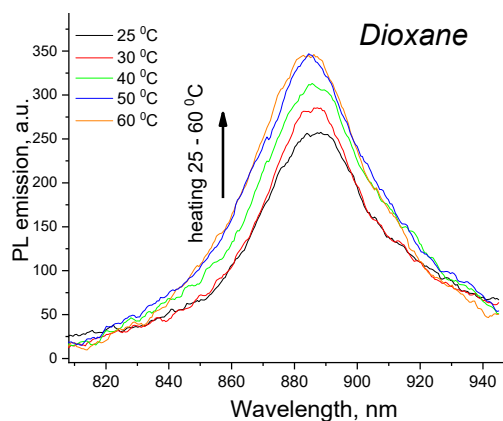
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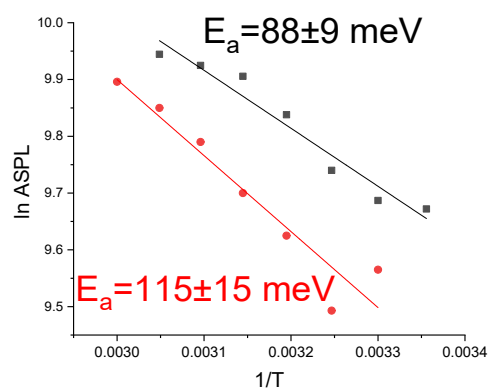
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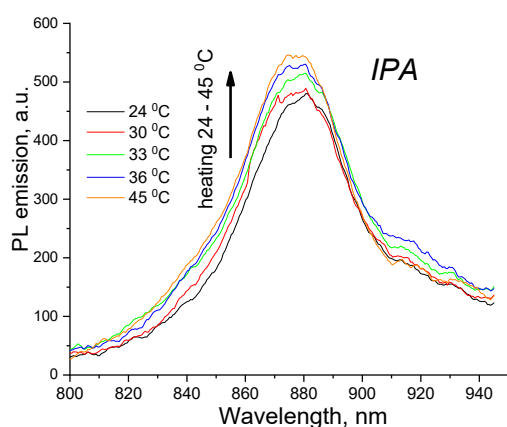
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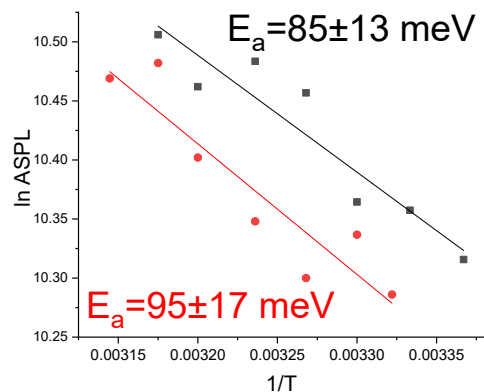
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h



j



k

Fig. S4. (a, c, e, g, j) Temperature dependences of ASPL ($\lambda_{\text{exc}}=980$ nm) and (b, d, f, h, k) Arrhenius plots of ASPL for (a, b) ACN, (c, d) DMSO (e, f) DMF, (g, h) Dioxane (10^{-5} M), and (j, k) IPA dye solutions (black symbols for heating and red symbols for cooling process, respectively). Concentration everywhere is 10^{-5} M.

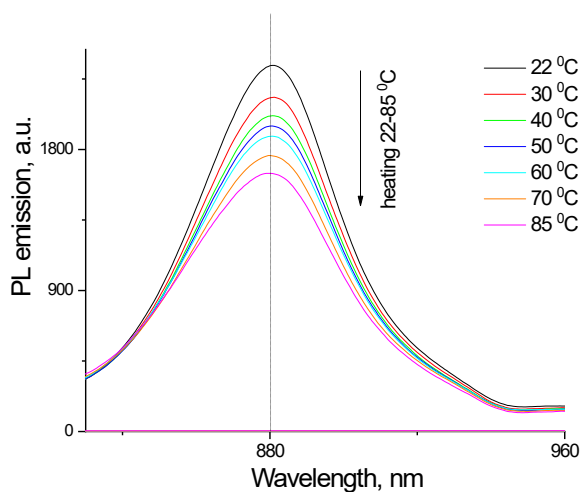


Fig. S5. Temperature dependence of the Stokes emission ($\lambda_{\text{exc}}=820$ nm) of the DMF dye solution (10^{-5} M).

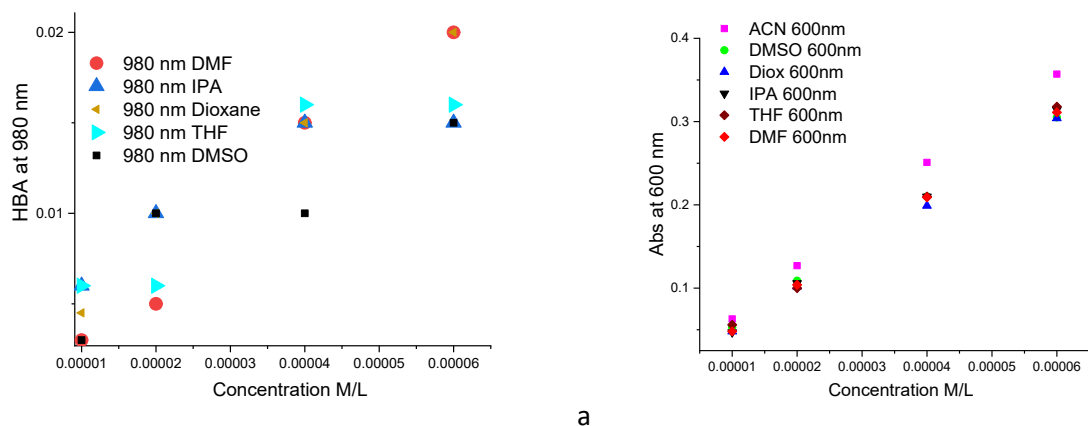


Fig. S6. Concentration dependence of the absorption of different solutions at (a) 980 nm and (b) 600 nm.