Electronic Supplementary Information
to the manuscript

Novel Highly Efficient Nanostructured Organosilicon Luminophore with Unusually Fast Photoluminescence

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1. GPC curves of TMS-PT, TMS-PTPTP-TMS, (PTPTP)Si$_2$(2T-Hex)$_6$ and its precursors

Figure S1. GPC curve of TPT (a) and PinB-TPT-BPin (b).

Figure S2. GPC curve of (PTPTP)Si$_2$(Hex-2T)$_6$ (a) and BrPhSi(2T-Hex)$_3$ (b).
Figure S3. GPC curve of TMS-TPT (a), TMS-PT-BPin (b), TMS-PTPTP-TMS (c).
2. NMR spectra of the compounds synthesized

Figure S4. $^1$H NMR spectrum of TPT (CDCl$_3$, 60°C, 250 MHz).
Figure S5. $^{13}$C NMR spectrum of **TPT** (CDCl$_3$, 60°C, 75 MHz).
Figure S6. $^1$H NMR spectrum of PinB-TPT-BPin (CDCl$_3$, 24°C, 300 MHz).
Figure S7. $^{13}$C NMR spectrum of PinB-TPT-BPin (CDCl$_3$, 24°C, 75 MHz).
Figure S8. $^1$H NMR spectrum of BrPhSi(OEt)$_3$ (CDCl$_3$, 24°C, 250 MHz).
Figure S9. $^1$H NMR spectrum of BrPhSiCl$_3$ (CDCl$_3$, 24°C, 300 MHz).
Figure S10. $^{13}$C NMR spectrum of BrPhSiCl$_3$(CDCl$_3$, 24°C, 75 MHz).
Figure S11. $^{29}$Si NMR spectrum of BrPhSiCl$_3$(CDCl$_3$, 24°C, 60 MHz).
### Table 1: Chemical Shifts (ppm) and Corresponding Values

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**Figure S12.** $^1$H NMR spectrum of **BrPhSi(2T-Hex)$_3$** (CDCl$_3$, 24°C, 250 MHz).
Figure S13. $^{13}$C NMR spectrum of BrPhSi(2T-Hex)$_3$ (CDCl$_3$, 24°C, 75 MHz).
Figure S14. $^{29}$Si NMR spectrum of $\text{BrPhSi}(2\text{T-Hex})_3$ (CDCl$_3$, 24°C, 60 MHz).
Figure S15. $^1$H NMR spectrum of (PTTP)Si$_2$(2T-Hex)$_6$ (CDCl$_3$, 24°C, 300 MHz).
Figure S16. $^{13}$C NMR spectrum of (PTPTP)$_2$Si$_2$(2T-Hex)$_6$ (CDCl$_3$, 24°C, 75 MHz).
Figure S17. $^{29}$Si NMR spectrum of (PTPTP)$_2$Si$_2$(2T-Hex)$_6$(CDCl$_3$), 24°C, 60 MHz.
Figure S18. $^1$H NMR spectrum of TMS-PT (CDCl$_3$, 24°C, 300 MHz).
Figure S19. $^{13}$C NMR spectrum of TMS-PT (CDCl$_3$, 22°C, 75 MHz).
Figure S20. $^{29}$Si NMR spectrum of TMS-PT (CDCl$_3$, 22°C, 60 MHz).

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## Figure S21

$^1$H NMR spectrum of **TMS-PT-BPin** (CDCl$_3$, 22°C, 300 MHz).

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Figure S22. $^{13}$C NMR spectrum of TMS-PT-BPin (CDCl$_3$, 22°C, 75 MHz).
Figure S23. $^{29}$Si NMR spectrum of **TMS-PT-BPin** (CDCl$_3$, 22°C, 60 MHz).

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Figure S24. $^1$H NMR spectrum of **TMS-PTPTP-TMS** (CDCl$_3$, 67°C, 300 MHz).
## Table

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## Figure S25

Figure S25. $^{13}$C NMR spectrum of TMS-PTPTP-TMS (CDCl$_3$, 67°C, 75 MHz).
Figure S26. $^{29}$Si NMR spectrum of TMS-PTTP-TMS (CDCl$_3$, 67°C, 60 MHz).
3. TGA of TMS-PTPTP-TMS and (PTPTP)Si₂(2T-Hex)₆

Figure S27. Thermogravimetric analysis (TGA) of TMS-PTPTP-TMS (a) and (PTPTP)Si₂(2T-Hex)₆ (b).
4. DSC traces of TMS-PTPTP-TMS and (PTPTP)Si$_2$(2T-Hex)$_6$

Figure S28. DSC traces of TMS-PTPTP-TMS.

Figure S29. DSC traces of PTTPSi$_2$(2T-Hex)$_6$. 
5. Optical spectra of TMS-2T-Hex, PTPTP and TMS-PTPTP-TMS

Figure S30. Absorption (a) and emission (b) spectra of TMS-2T-Hex.

Figure S31. Absorption (a) and emission (b) spectra of PTPTP.

Figure S32. Absorption (a) and emission (b) spectra of TMS-PTPTP-TMS.
6. Table S1. Visualization of the frontier molecular orbitals of the structural analogs of NOL’s donor and acceptor constituents (isosurfaces at ±0.015).

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7. Experimental results of PL lifetime measurements

Figure S33. PL decay time measurements of TMS-2T-Hex in THF at 310 nm excitation.

Figure S34. PL decay time measurements of PTPTP in THF at 369 nm excitation.
Figure S35. PL decay time measurements of TMS-PTTP-TMS in THF at 369 nm excitation.

Figure S36. PL decay time measurements of NOL in THF at 369 nm excitation.
Figure S37. PL decay time measurements of **NOL** in THF at 340 nm excitation.

![Graph showing PL decay time measurements of NOL in THF.](image1)

Figure S38. Comparison of PL decay time curves for **POPOP** and **NOL** in THF.

![Graph comparing PL decay time curves for POPOP and NOL in THF.](image2)

Figure S39. Comparison of PL decay time curves for **POPOP** and **NOL** in toluene.

![Graph comparing PL decay time curves for POPOP and NOL in toluene.](image3)
8. Optimized molecular model of NOL with the distances between donors and acceptor fragments

Figure S40. Optimized molecular model of NOL with measured distances between the donors 2T and acceptor PTTP fragments (in Å).
9. List of display items

Figure S1. GPC curve of TPT (a) and PinB-TPT-BPin (b)  
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Figure S23. ²⁹Si NMR spectrum of TMS-PT-BPin (CDCl₃, 22°C, 60 MHz)  
Figure S24. ¹H NMR spectrum of TMS-PTPTP-TMS (CDCl₃, 67°C, 300 MHz)  
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Figure S26. ²⁹Si NMR spectrum of TMS-PTPTP-TMS (CDCl₃, 67°C, 60 MHz)  
Figure S27. TGA of TMS-PTPTP-TMS (a) and (PTPTP)Si₂(2T-Hex)₆ (b)
Figure S28. DSC of TMS-PTPTP-TMS

Figure S29. DSC of (PTPTP)Si$_2$(2T-Hex)$_6$

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Figure S31. Absorption (a) and emission (b) spectra of PTPTP

Figure S32. Absorption (a) and emission (b) spectra of TMS-PTPTP-TMS

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Figure S36. PL decay time measurements of NOL in THF at 369 nm excitation

Figure S37. PL decay time measurements of NOL in THF at 340 nm excitation

Figure S38. Comparison of PL decay time curves for POPOP and NOL in THF

Figure S39. Comparison of PL decay time curves for POPOP and NOL in toluene

Figure S40. Molecular model of optimized NOL with measured distances between the donors 2T and acceptor PTPTP fragments (in Å)