Electronic Supplementary Information

Bifunctional Cross-Conjugated Luminescent Phosphines and Phosphine Derivatives: \textit{phospha-Cruciforms}

Anshuman Mangalum and Rhett C. Smith*

Department of Chemistry and Center for Optical Materials Science and Engineering Technologies (COMSET), Clemson University, Clemson, SC 29634

Email: rhett@clemson.edu

List of Supporting Information Figures:

\textbf{Figure S1.} Proton NMR spectrum of compound 8 (CDCl$_3$, 300 MHz)
\textbf{Figure S2} Aromatic and aliphatic region of the Proton NMR spectrum of compound 8 (CDCl$_3$, 300 MHz)
\textbf{Figure S3} Carbon-13 NMR spectrum of compound 8 (CDCl$_3$, 75 MHz)
\textbf{Figure S4} Aromatic region of the Carbon-13 NMR spectrum of compound 8 (CDCl$_3$, 75 MHz)
\textbf{Figure S5} Aromatic region of the Carbon-13 NMR spectrum of compound 8 (CDCl$_3$, 75 MHz)
\textbf{Figure S6} Phosphorous-31 NMR of compound 8 (CDCl$_3$, 121 MHz)
\textbf{Figure S7} Proton NMR spectrum of compound 9 (CDCl$_3$, 300 MHz)
\textbf{Figure S8} Aromatic region of the Proton NMR spectrum of compound 9 (CDCl$_3$, 300 MHz)
\textbf{Figure S9} Carbon-13 NMR spectrum of compound 9 (CDCl$_3$, 75 MHz)
\textbf{Figure S10} Aromatic region of the Carbon-13 NMR spectrum of compound 9 (CDCl$_3$, 75 MHz)
\textbf{Figure S11} Phosphorous-31 NMR of compound 9 (CDCl$_3$, 121 MHz)
\textbf{Figure S12} Proton NMR spectrum of compound 10 (CDCl$_3$, 300 MHz)
\textbf{Figure S13} Aromatic region of the Proton NMR spectrum of compound 10 (CDCl$_3$, 300 MHz)
\textbf{Figure S14} Carbon-13 NMR spectrum of compound 10 (CDCl$_3$, 75 MHz)
\textbf{Figure S15} Aromatic region of the Carbon-13 NMR spectrum of compound 10 (CDCl$_3$, 75 MHz)
\textbf{Figure S16} Phosphorous-31 NMR of compound 10 (CDCl$_3$, 121 MHz)
\textbf{Figure S17} Proton NMR spectrum of compound 11 (CDCl$_3$, 300 MHz)
\textbf{Figure S18} Aromatic region of the Proton NMR spectrum of compound 11 (CDCl$_3$, 300 MHz)
\textbf{Figure S19} Carbon-13 NMR spectrum of compound 11 (CDCl$_3$, 75 MHz)
\textbf{Figure S20} Aromatic region of the Carbon-13 NMR spectrum of compound 11 (CDCl$_3$, 75 MHz)
\textbf{Figure S21} Phosphorous-31 NMR of compound 11 (CDCl$_3$, 121 MHz)
\textbf{Figure S22} Proton NMR spectrum of compound 12 (CDCl$_3$, 300 MHz)
\textbf{Figure S23} Aromatic region of the Proton NMR spectrum of compound 12 (CDCl$_3$, 300 MHz)
\textbf{Figure S24} Carbon-13 NMR spectrum of compound 12 (CDCl$_3$, 75.4 MHz)
\textbf{Figure S25} Phosphorous-31 NMR of compound 12 (CDCl$_3$, 121.4 MHz)
\textbf{Figure S26} Phosphorous-31 NMR of compound 13 (CDCl$_3$, 121 MHz)
Figure S1. Proton NMR spectrum of 8 (CDCl₃, 300 MHz). Peak marked with an asterisk correspond to solvent signals.
**Figure S2.** Aromatic and aliphatic region of the Proton NMR spectrum of compound 8 (CDCl₃, 300 MHz)
Figure S3. Carbon-13 NMR spectrum of compound \textbf{8} (CDCl$_3$, 75 MHz).
Figure S4. Aromatic region of the Carbon-13 NMR spectrum of compound 8 (CDCl$_3$, 75 MHz)
Figure S5. Aromatic region of the Carbon-13 NMR spectrum of compound 8 (CDCl₃, 75 MHz)
Figure S6. Phosphorous-31 NMR of compound 8 (CDCl₃, 121 MHz)
Figure S7. Proton NMR spectrum of compound 9 (CDCl₃, 300 MHz)
Figure S8. Aromatic region of the Proton NMR spectrum of compound 9 (CDCl$_3$, 300 MHz). Peak marked with an asterisk correspond to residual solvent signals.
Figure S9. Carbon-13 NMR spectrum of compound 9 (CDCl$_3$, 75 MHz). Peak marked with an asterisk correspond to residual solvent signals.
Figure S10. Aromatic region of the Carbon-13 NMR spectrum of compound 9 (CDCl₃, 75 MHz)
Figure S11. Phosphorous-31 NMR of compound 9 (CDCl₃, 121 MHz)
Figure S12. Proton NMR spectrum of compound 10 (CDCl₃, 300 MHz). Peak marked with an asterisk correspond to residual solvent signals.
Figure S13. Aromatic region of the Proton NMR spectrum of compound 10 (CDCl₃, 300 MHz)
Figure S14. Carbon-13 NMR spectrum of compound 10 (CDCl₃, 75 MHz)
Figure S15. Aromatic region of the Carbon-13 NMR spectrum of compound 10 (CDCl₃, 75 MHz)
Figure S16. Phosphorous-31 NMR of compound 10 (CDCl₃, 121 MHz)
Figure S17. Proton NMR spectrum of compound 11 (CDCl₃, 300 MHz). Peak marked with an asterisk correspond to residual solvent signals.
Figure S18. Aromatic region of the Proton NMR spectrum of compound 11 (CDCl₃, 300 MHz)
Figure S19. Carbon-13 NMR spectrum of compound 11 (CDCl₃, 75 MHz)
Figure S20. Aromatic region of the Carbon-13 NMR spectrum of compound 11 (CDCl₃, 75 MHz)
Figure S21. Phosphorous-31 NMR of compound 11 (CDCl₃, 121 MHz)
Figure S22  Proton NMR spectrum of compound 12 (CDCl$_3$, 300 MHz)
**Figure S23**  Aromatic region of the Proton NMR spectrum of compound 12 (CDCl₃, 300 MHz)
Figure S24  Carbon-13 NMR spectrum of compound 12 (CDCl₃, 75.4 MHz)
Figure S25  Phosphorous-31 NMR of compound 12 (CDCl$_3$, 121.4 MHz)
Figure S26. Phosphorous-31 NMR of compound 13 (CDCl₃, 121 MHz)