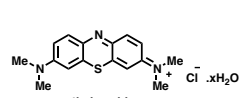
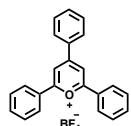


# Photocatalyst Library for the Development of Novel Organic Reactions (EP/P007589/1)

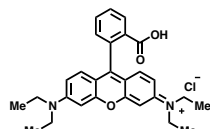
## Dr James R. Donald and Dr William P. Unsworth – University of York



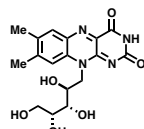
**methylene blue**  
 $\lambda_{\text{max}}$  650 nm  
 $E^{\circ}(\text{S}^{\bullet}/\text{S}^{\bullet-}) +1.56 \text{ V}$   
 $E^{\circ}(\text{S}/\text{S}^{\bullet-}) -0.30 \text{ V}$



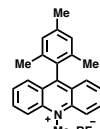
**2,4,6-triphenylpyrylium tetrafluoroborate**  
 $\lambda_{\text{max}}$  415 nm  
 $E^{\circ}(\text{S}^{\bullet}/\text{S}^{\bullet-}) +2.55 \text{ V}$   
 $E^{\circ}(\text{S}/\text{S}^{\bullet-}) -0.32 \text{ V}$



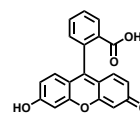
**rhodamine B**  
 $\lambda_{\text{max}}$  550 nm  
 $E^{\circ}(\text{S}^{\bullet}/\text{S}^{\bullet-}) +1.26 \text{ V}$   
 $E^{\circ}(\text{S}/\text{S}^{\bullet-}) -0.96 \text{ V}$   
 $E^{\circ}(\text{S}^{\bullet+}/\text{S}^{\bullet}) -1.31 \text{ V}$   
 $E^{\circ}(\text{S}^{\bullet}/\text{S}) +0.91 \text{ V}$



**(-)-riboflavin**  
 $\lambda_{\text{max}}$  440 nm  
 $E^{\circ}(\text{S}^{\bullet}/\text{S}^{\bullet-}) +1.5 \text{ V}$   
 $E^{\circ}(\text{S}/\text{S}^{\bullet-}) -0.5 \text{ V}$



**9-mesityl-10-methylacridinium tetrafluoroborate**  
 $\lambda_{\text{max}}$  425 nm  
 $E^{\circ}(\text{S}^{\bullet}/\text{S}^{\bullet-}) +2.08 \text{ V}$   
 $E^{\circ}(\text{S}/\text{S}^{\bullet-}) -0.57 \text{ V}$



**fluorescein**  
 $\lambda_{\text{max}}$  437 nm (FLH<sub>2</sub>), 491 nm (FL<sup>2-</sup>)  
 $E^{\circ}(\text{S}^{\bullet}/\text{S}^{\bullet-}) +1.25 \text{ V}$   
 $E^{\circ}(\text{S}/\text{S}^{\bullet-}) -1.17 \text{ V}$   
 $E^{\circ}(\text{S}^{\bullet+}/\text{S}^{\bullet}) -1.55 \text{ V}$   
 $E^{\circ}(\text{S}^{\bullet}/\text{S}) +0.87 \text{ V}$



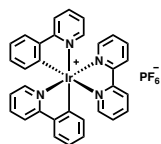
**9,10-dicyanoanthracene**  
 $\lambda_{\text{max}}$  422 nm  
 $E^{\circ}(\text{S}^{\bullet}/\text{S}^{\bullet-}) +1.99 \text{ V}$   
 $E^{\circ}(\text{S}/\text{S}^{\bullet-}) -0.91 \text{ V}$



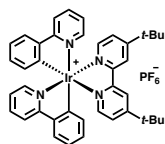
**xanthone**  
 $\lambda_{\text{max}}$  340 nm  
 $E^{\circ}(\text{S}^{\bullet}/\text{S}^{\bullet-}) +1.76 \text{ V}$   
 $E^{\circ}(\text{S}/\text{S}^{\bullet-}) -1.65 \text{ V}$   
 $E^{\circ}(\text{S}^{\bullet+}/\text{S}^{\bullet}) -1.61 \text{ V}$   
 $E^{\circ}(\text{S}^{\bullet}/\text{S}) +1.8 \text{ V}$



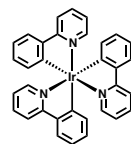
**9-fluorenone**  
 $\lambda_{\text{max}}$  377 nm  
 $E^{\circ}(\text{S}^{\bullet}/\text{S}^{\bullet-}) +0.96 \text{ V}$   
 $E^{\circ}(\text{S}/\text{S}^{\bullet-}) -1.35 \text{ V}$   
 $E^{\circ}(\text{S}^{\bullet+}/\text{S}^{\bullet}) -0.61 \text{ V}$   
 $E^{\circ}(\text{S}^{\bullet}/\text{S}) +1.7 \text{ V}$



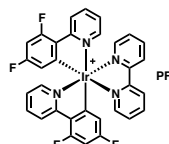
**Ir[(ppy)<sub>2</sub>(bpy)] PF<sub>6</sub>**  
 $\lambda_{\text{max}}$  ? nm  
 $E^{\circ}(\text{Ir}^{\text{III}}/\text{Ir}^{\text{II}}) ? \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{II}}/\text{Ir}^{\text{I}}) ? \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{III}}) ? \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{II}}) ? \text{ V}$



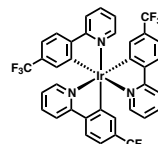
**Ir[(ppy)<sub>2</sub>(dtbbpy)] PF<sub>6</sub>**  
 $\lambda_{\text{max}}$  410 nm  
 $E^{\circ}(\text{Ir}^{\text{III}}/\text{Ir}^{\text{II}}) +0.66 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{II}}/\text{Ir}^{\text{I}}) -1.51 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{III}}) -0.96 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{II}}) +1.21 \text{ V}$



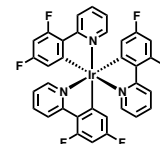
**fac-Ir(ppy)<sub>3</sub>**  
 $\lambda_{\text{max}}$  375 nm  
 $E^{\circ}(\text{Ir}^{\text{III}}/\text{Ir}^{\text{II}}) +0.31 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{II}}/\text{Ir}^{\text{I}}) -2.19 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{III}}) -1.73 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{II}}) +0.77 \text{ V}$



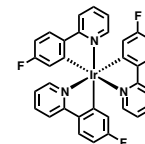
**Ir(2',4'-dFppy)<sub>2</sub>(bpy)] PF<sub>6</sub>**  
 $\lambda_{\text{max}}$  ? nm  
 $E^{\circ}(\text{Ir}^{\text{III}}/\text{Ir}^{\text{II}}) ? \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{II}}/\text{Ir}^{\text{I}}) ? \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{III}}) ? \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{II}}) ? \text{ V}$



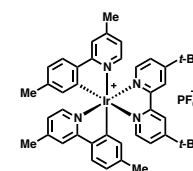
**Ir(4'-CF<sub>3</sub>ppy)<sub>3</sub>**  
 $\lambda_{\text{max}}$  372 nm  
 $E^{\circ}(\text{Ir}^{\text{III}}/\text{Ir}^{\text{II}}) +0.59 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{II}}/\text{Ir}^{\text{I}}) -2.18 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{III}}) -1.70 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{II}}) +1.07 \text{ V}$



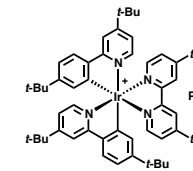
**Ir(2',4'-CF<sub>3</sub>ppy)<sub>3</sub>**  
 $\lambda_{\text{max}}$  378 nm  
 $E^{\circ}(\text{Ir}^{\text{III}}/\text{Ir}^{\text{II}}) +0.36 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{II}}/\text{Ir}^{\text{I}}) -2.18 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{III}}) -1.28 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{II}}) +0.94 \text{ V}$



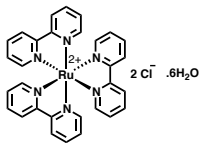
**Ir(4'-CF<sub>3</sub>ppy)<sub>3</sub>**  
 $\lambda_{\text{max}}$  380 nm  
 $E^{\circ}(\text{Ir}^{\text{III}}/\text{Ir}^{\text{II}}) +0.69 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{II}}/\text{Ir}^{\text{I}}) -2.18 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{III}}) -1.91 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{II}}) +0.96 \text{ V}$



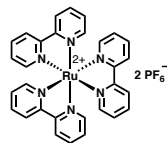
**Ir[(3,4'-dMeppy)<sub>2</sub>(dtbbpy)] PF<sub>6</sub>**  
 $\lambda_{\text{max}}$  450 nm  
 $E^{\circ}(\text{Ir}^{\text{III}}/\text{Ir}^{\text{II}}) +0.55 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{II}}/\text{Ir}^{\text{I}}) -1.52 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{III}}) -0.87 \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{II}}) +1.21 \text{ V}$



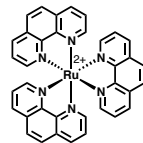
**Ir[(3,4'-dtbbpy)<sub>2</sub>(dtbbpy)] PF<sub>6</sub>**  
 $\lambda_{\text{max}}$  ? nm  
 $E^{\circ}(\text{Ir}^{\text{III}}/\text{Ir}^{\text{II}}) ? \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{II}}/\text{Ir}^{\text{I}}) ? \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{III}}) ? \text{ V}$   
 $E^{\circ}(\text{Ir}^{\text{IV}}/\text{Ir}^{\text{II}}) ? \text{ V}$



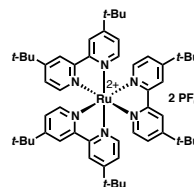
**Ru(bpy)<sub>3</sub> Cl<sub>2</sub>**  
 $\lambda_{\text{max}}$  452 nm  
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}) +0.77 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}^{\text{I}}) -1.33 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{II}}) -0.81 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{I}}) +1.29 \text{ V}$



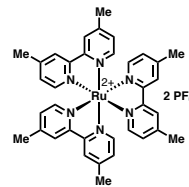
**Ru(bpy)<sub>3</sub> (PF<sub>6</sub>)<sub>2</sub>**  
 $\lambda_{\text{max}}$  452 nm  
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}) +0.77 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}^{\text{I}}) -1.33 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{II}}) -0.81 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{I}}) +1.29 \text{ V}$



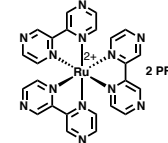
**Ru(phen)<sub>3</sub> (PF<sub>6</sub>)<sub>2</sub>**  
 $\lambda_{\text{max}}$  422 nm  
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}) +0.82 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}^{\text{I}}) -1.36 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{II}}) -0.87 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{I}}) +1.26 \text{ V}$



**Ru(dtbbpy)<sub>3</sub> (PF<sub>6</sub>)<sub>2</sub>**  
 $\lambda_{\text{max}}$  459 nm  
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}) ? \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}^{\text{I}}) ? \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{II}}) ? \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{I}}) ? \text{ V}$



**Ru(d(Me)bpy)<sub>3</sub> (PF<sub>6</sub>)<sub>2</sub>**  
 $\lambda_{\text{max}}$  457 nm  
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}) +0.22 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}^{\text{I}}) ? \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{II}}) -1.43 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{I}}) +1.14 \text{ V}$



**Ru(bpz)<sub>3</sub> (PF<sub>6</sub>)<sub>2</sub>**  
 $\lambda_{\text{max}}$  443 nm  
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}) +1.45 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{II}}/\text{Ru}^{\text{I}}) -0.80 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{II}}) -0.26 \text{ V}$   
 $E^{\circ}(\text{Ru}^{\text{III}}/\text{Ru}^{\text{I}}) +1.86 \text{ V}$