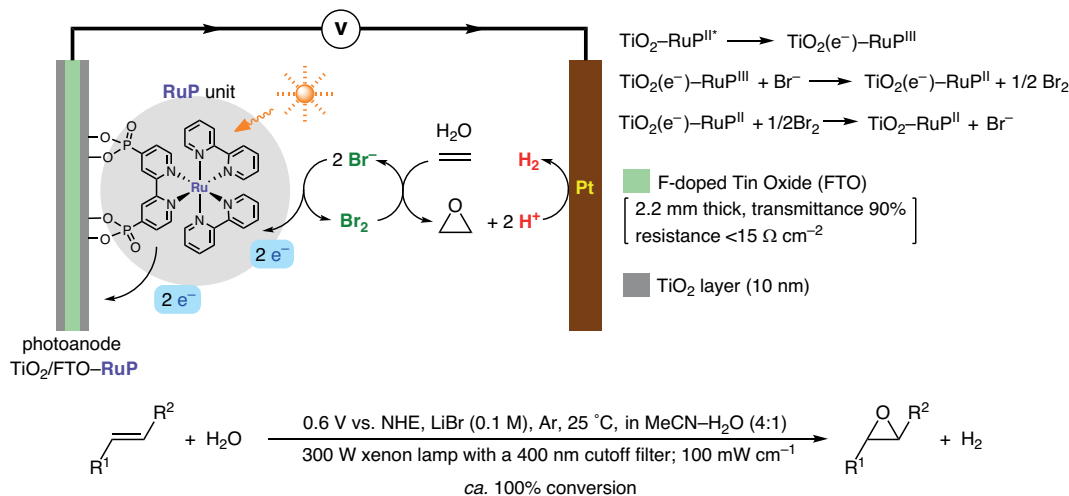


Photoelectrochemical Alkene Epoxidation with Water Using a TiO₂-Ru Anode



R	Selectivity	FE value
H	99%	64%
Me	97%	72%
OMe	92%	75%
t-Bu	95%	80%
Ph	98%	57%
F	98%	65%
Cl	97%	65%
Br	98%	67%

FE = Faradaic efficiency

R = H
 92% selectivity; 40% FE value
 R = Me
 93% selectivity; 45% FE value

Significance: A dye-sensitized photoelectrode was fabricated by the deposition of RuP on a mesoporous TiO₂-coated FTO composite (TiO₂/FTO-RuP). Photoelectrochemical Br-mediated epoxidation of styrenes with water as an oxygen source was examined using TiO₂/FTO-RuP (anode) and platinum (cathode) in the presence of LiBr under 400 nm photoirradiation to afford up to 99% yield of styrene oxide along with H₂ evolution with high Faradaic efficiency.

Comment: The redox potential of TiO₂/FTO-RuP (Ru^{III/II}) was determined to be 1.38 V vs. normal hydrogen electrode (NHE) being suitable for the oxidation of LiBr. Aromatic halides (F, Cl, Br) were well tolerated under the photoelectrochemical conditions. RuP exhibited high stability on TiO₂. Thus, the metal-to-ligand charge transfer (MLCT) absorption loss for RuP on TiO₂ was only 5% during five hours of photoirradiation.