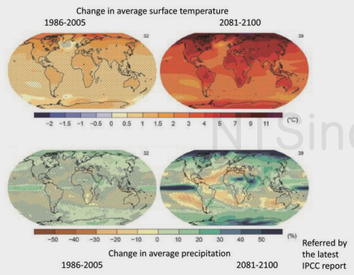
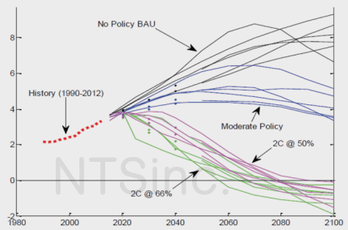
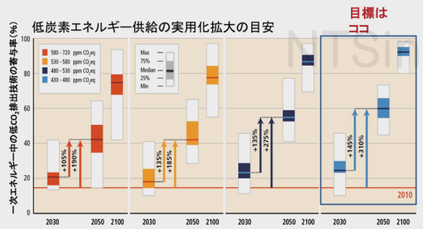
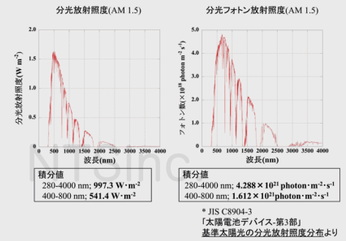
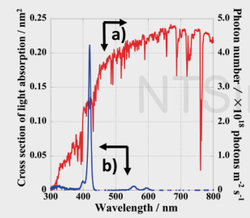
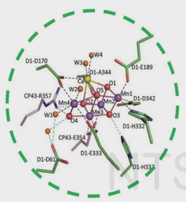


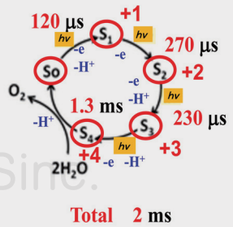


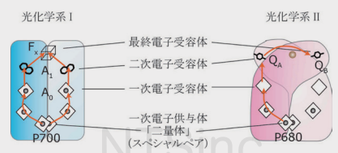


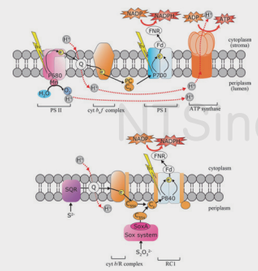


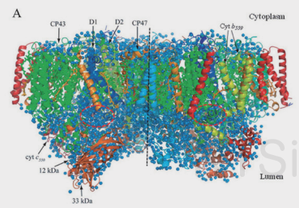


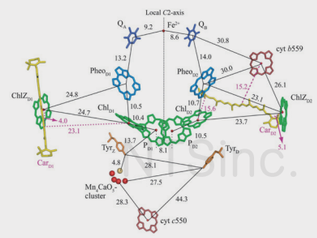


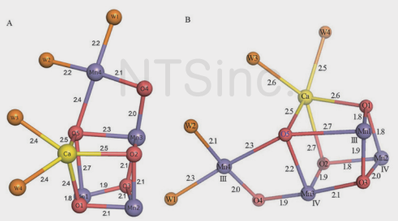


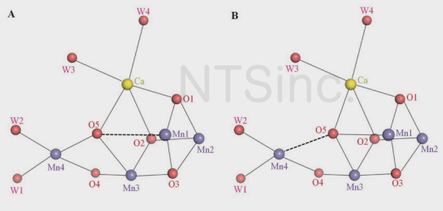


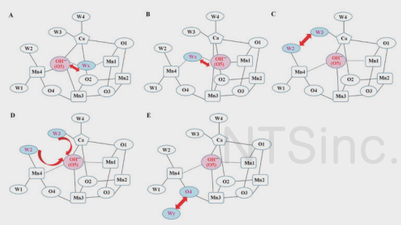


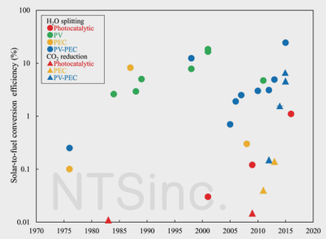


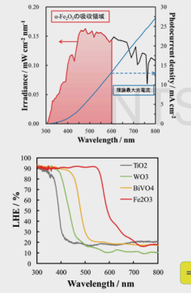








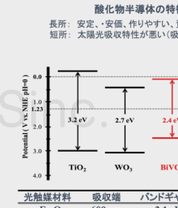




酸化物半導体の特徴

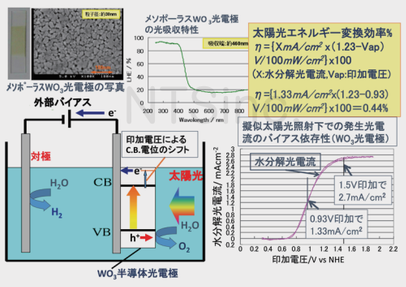
長所：安定、・安価、作りやすい、資源的制約少ない

短所：太陽光吸収特性が悪い(吸収端、吸光係数が低い)



光触媒材料	吸収端	バンドギャップ	理論最大光電流
α-Fe_2O_3	600 nm	2.1 eV	12.6 mA/cm^2
TiO_2(rutile)	420 nm	3.0～3.2 eV	2.2 mA/cm^2
WO_3	470 nm	2.7 eV	4.5 mA/cm^2
$BiVO_4$	520 nm	2.4 eV	7.6 mA/cm^2

⇒ 太陽光水素製造の実用化という観点から魅力的な材料もある。



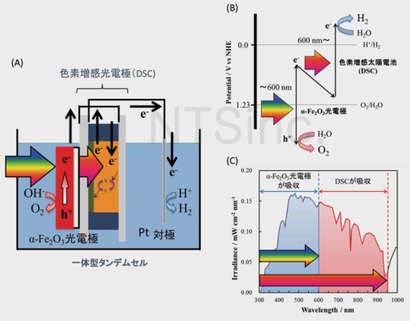
太陽光エネルギー変換効率%

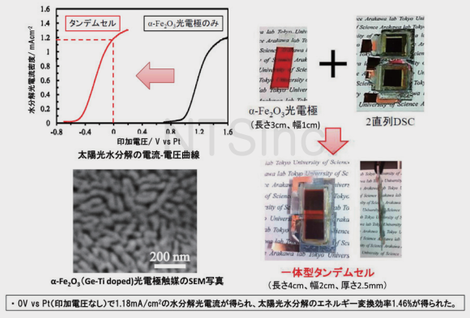
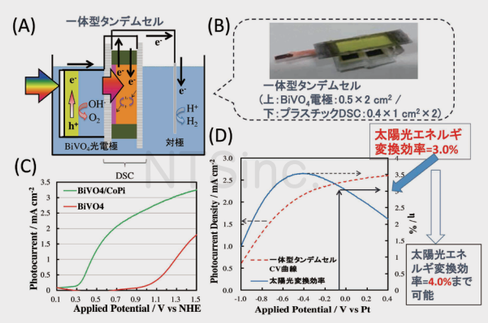
$\eta = \{X mA/cm^2 \times (1.23 - Vap) V/100 mW/cm^2\} \times 100$

(X:水分解光電流,Vap:印加電圧)

$\eta = \{1.33 mA/cm^2 \times (1.23 - 0.93) V/100 mW/cm^2\} \times 100 = 0.44\%$

擬似太陽光照射下での発生光電流のバイアス依存性(WO_3光電極)





・0V vs Pt(印加電圧なし)で1.18mA/cm^{2}の水分解光電流が得られ、太陽光水分解のエネルギー変換効率1.46%が得られた。