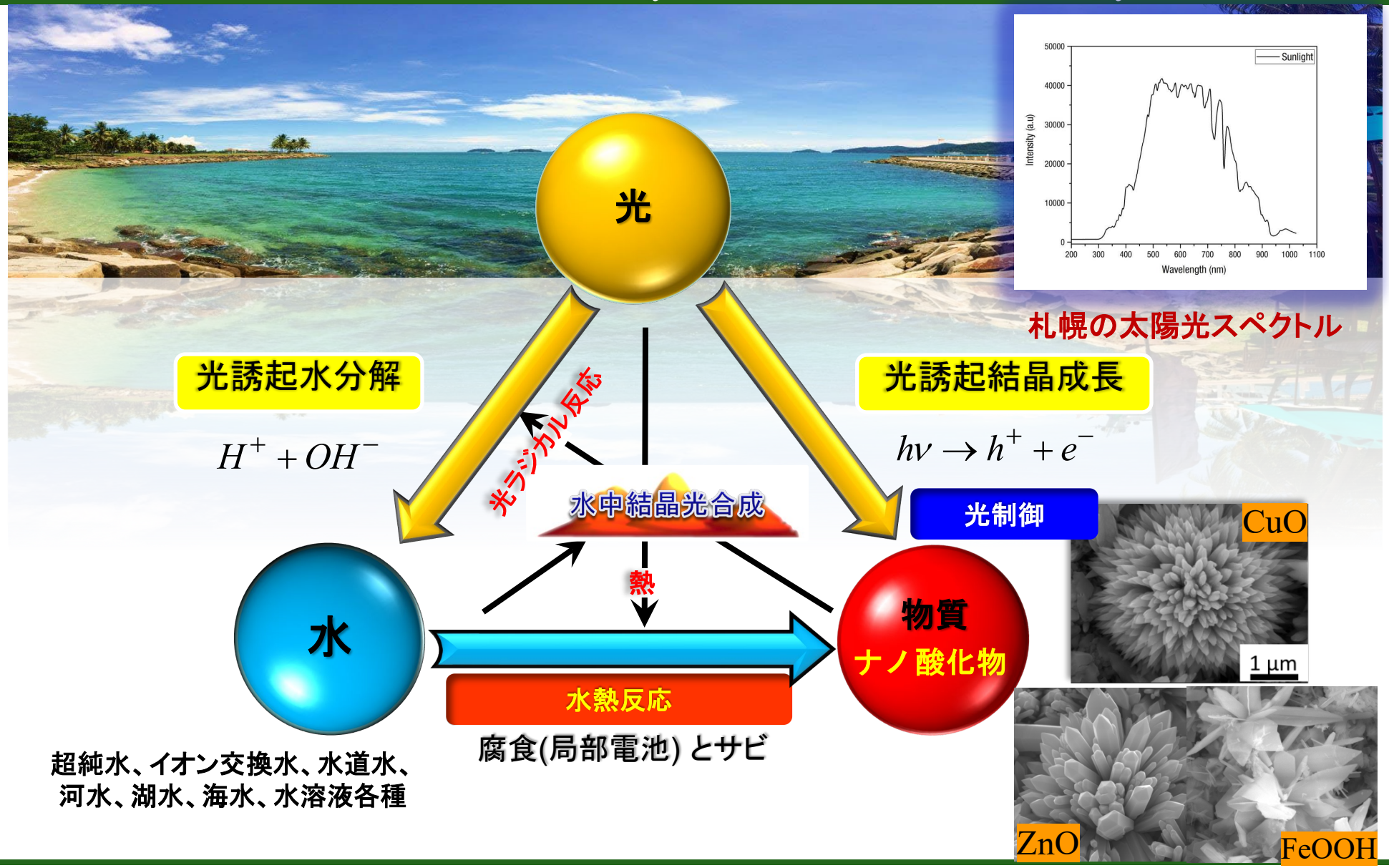
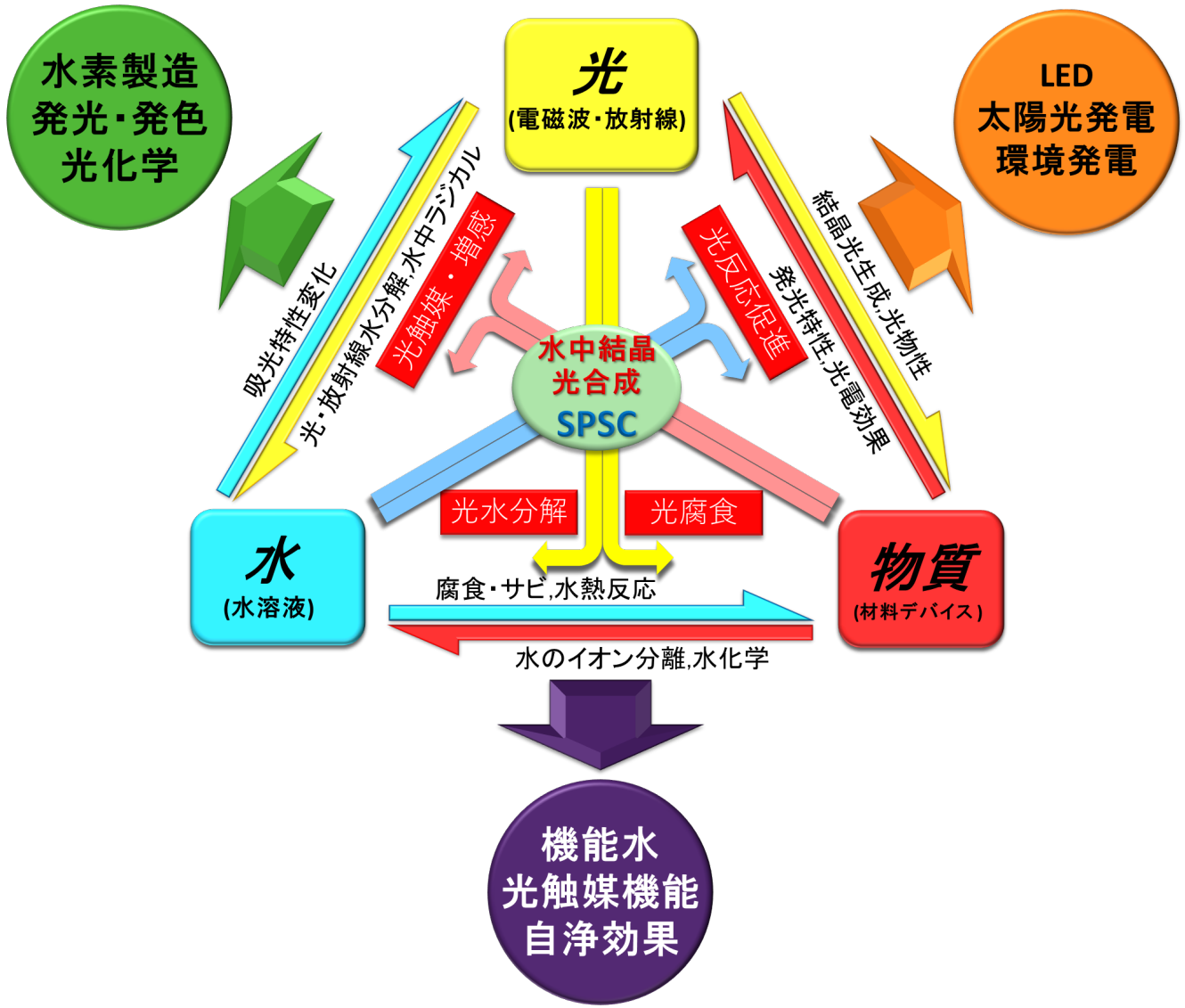


札幌の太陽光スペクトル

SPSC(Submerged-Photo-Synthesis-of-Crystallites)
光・水・物質の相互作用



グリーンケミストリー環境・水化学
【(太陽)光利用材料化学】

- 光触媒効果【有機物合成,水分解、超撥水】
- 光分解、光重合
- 水ラジカル化学(放射線水化学)
- 人工光合成
- 環境水浄化
- その他、環境指標

グリーンエナジー【光水素製造】
エネルギー　【光ガルバニ電池】

- 再生可能エネルギー創生
- 水素エネルギー製造
- 太陽エネルギー利用
- 光エネルギー変換
- その他、エネルギー材料

水中結晶光合成:SPSCの研究ターゲット
グリーンテクノロジーのための光材料科学

グリーンナノテク【結晶光合成】
2D-3Dヘテロナノ構造

- ナノフラワー
- ナノプレート
- ナノロッド
- ナノボール

その他、低次元構造ナノ粒子

光学デバイス創製【水中光電析】

- 発光デバイス
- 光電デバイス
- 光磁気デバイス
- 光吸収体
- 光導電体
- ワイドギャップ半導体
- その他LED, レーザー応用など

A bit of history on SPSC

SPSC: ultra-pure water

2015-Single metal oxides: Nano flowers, Nanorods
ZnO[1,2,3,5], CuO[4], FeOOH[8], WO_3 [12], e-TiO_2[16]

Galvanic-SPSC

2019-Hetero structures: Nanorods@metal surfaces
ZnO@Cu, Ni, Ag, Au, Pt, W [6,7,9] , CuO@Au[9]

ROS-SPSC

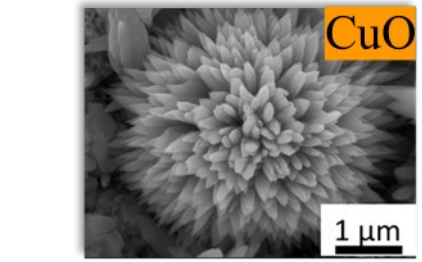
2020- Water splitting, H_2O_2 related
Aqua-ion splitting [10], Tangustic acids &Photochromic[11,12]

2022- 3D Heterostructures: Hetero-Semiconductors
ZnO-NRs@CuO-NW[13,16], ZnO-NRs@Si[14],

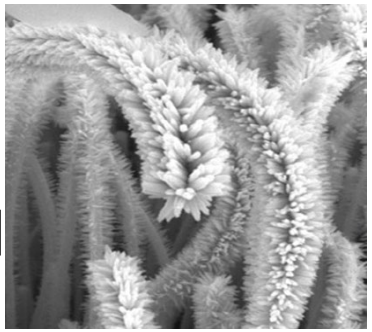
2023- Multi-Component & Device MC-SPSC:
Doping: Fe,Cu,Co,Mo-WO_3・nH_2O[15,17-20], *Fe-MO_3*
Hetero-nano-oxides: TiO_2-WO_3 , CuO-WO_3

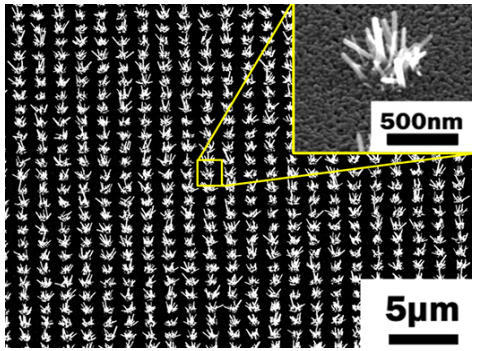
SPSC-Methanation (for CH_4, H_2 generation)

2023- Photo-Sabatier: *$FeCO_3$.&Zn, Mg etc*

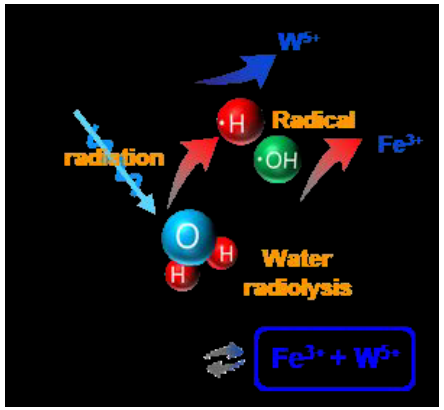





ZnO/CuO nano-forest



ZnO-NRs@Si patterned



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