**Molecular Photoconversion Devices Division (hv to H2, electricity)**

http://i2cner.kyushu-u.ac.jp/upload\_file/editor\_files/Division-Road-Map-2017/Molecular\_Photoconversion\_Devices\_June\_2017\_Final\_version\_role\_edit3.pdf

1. **Org-inorg hybrid perovskite solar cell – 2021-2025:** >25% efficiency, “50% lifetime > 50000h”. 2025-2050 - > 30% efficiency, “50% lifetime > 90000h”.
2. **Hybrid catalyst for photo water splitting –** doesseem promising or relevant
3. **Solar fuel (H2, HCOOH, CH3OH, CH4) –** 2025-2050 : application in solar energy conversion and storage => not relevant?
4. **High pressure cpds for photocatalysis –** 2021-2025: convert co2 to fuels, 10% efficiency, 2025-2050 – 20% efficiency (needs more research)
5. **OLEDs/hybrid perovskite LEDs –** not relevant
6. **Low friction bearings/surface molecular brush –** not relevant

## Hydrogen Materials Compatibility Division (not relevant)

## http://i2cner.kyushu-u.ac.jp/upload\_file/editor\_files/Division-Road-Map-2017/Hydrogen\_Materials\_Compatibility\_June\_2017\_Final\_version\_role\_edit3.pdf

## **Predictive models of H2-assisted cracking**

## **Material development for H2 service**

## **Modelling environmental effects on friction and tribological failures**

## **Electrochemical Energy Conversion Division**

## http://i2cner.kyushu-u.ac.jp/upload\_file/editor\_files/Division-Road-Map-2017/Electrochemical\_Energy\_Conversion\_June\_2017\_Final\_version\_role\_edit3.pdf

1. Electrode -not relevant
2. Electrolyte – not relevant
3. **Polymer electrolyte fuel cell (PEFC)** – **automotive (more research)**
4. **Solid Oxide fuel Cell (SOFC) – stationary electricity generation (more research)**
5. Energy Storage – not modelling

**Thermal Science and Engineering Division**

<http://i2cner.kyushu-u.ac.jp/upload_file/editor_files/Division-Road-Map-2017/Thermal_Science_Engineering_June_2017_Final_version_role_edit3.pdf>

1. TP1-TP3 : measurement of thermophysical properties
2. HMT1 and HMT2 : phase change heat transfer, adsorption study
3. TES1 : Adsoprtion heat pump, refrigeration system for waste heat utilization (50 -200 C)
4. TES2: Vapour compression heat pump/refrigeration system with low GWP refrigerants, high COP
5. **TES3: IGCC (syngas) and H2 oxy (liquid H2) power gen system :** 2031-50 – pilot scale plant system – 1 MWt power gen system (prototype? commercial deployment? electric output/figures?) need data

## **Catalytic Materials Transformations Division**

## <http://i2cner.kyushu-u.ac.jp/upload_file/editor_files/Division-Road-Map-2017/Catalytic_Material_Transformation_June_2017_Final_version_role_edit3.pdf>

## Catalyst development

## Catalysis process development for carbon neutral power generation cycles

## CO2 Capture and Utilization (CCU) Division