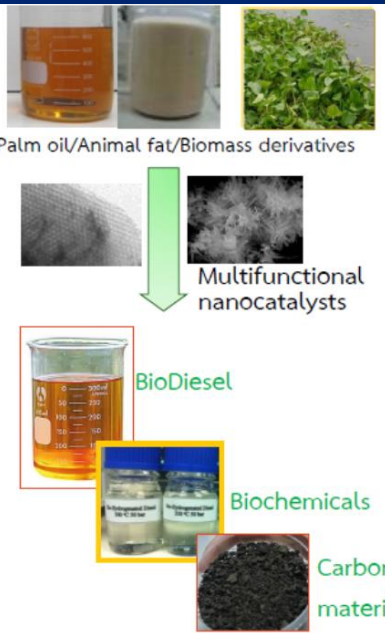
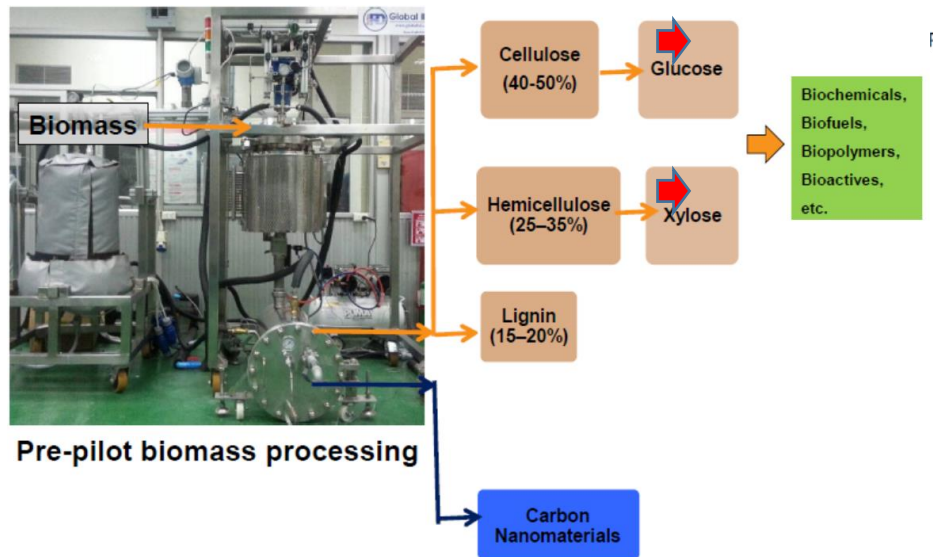


Innovations in Biomass Application for Catalytic Material Synthesis and Energy Devices

Conversion of biomass to functional materials & fuels



Packs of high-pressure and low-pressure continuous processes



Catalytic materials for biomass conversion to γ -valerolactone

H₂ storage materials

Electrocatalysts for H₂O₂ production

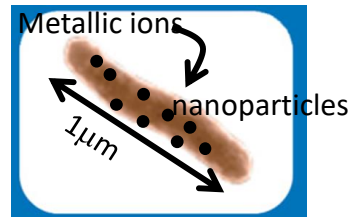
etc.

NANOTEC
CU

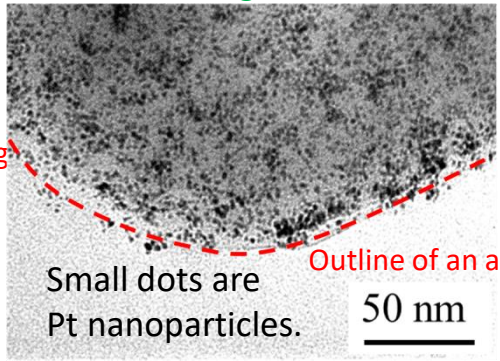
Algae can reduce metallic ions. => Recover rare metals from wastewater by its beathing.



Human is breathing by taking O₂ and releasing CO₂.

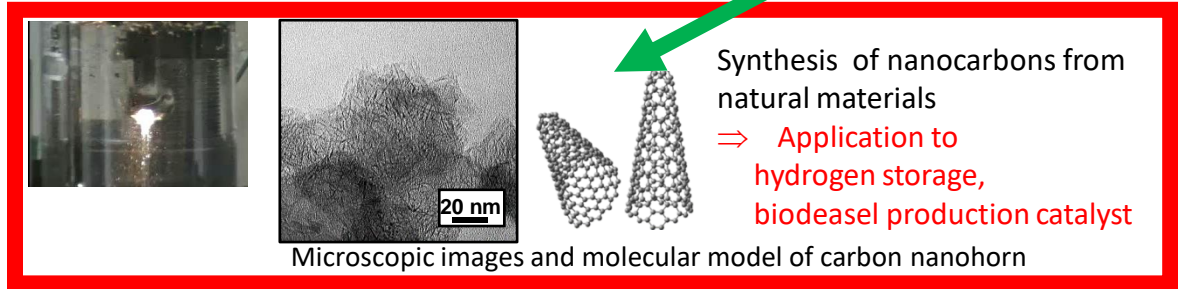
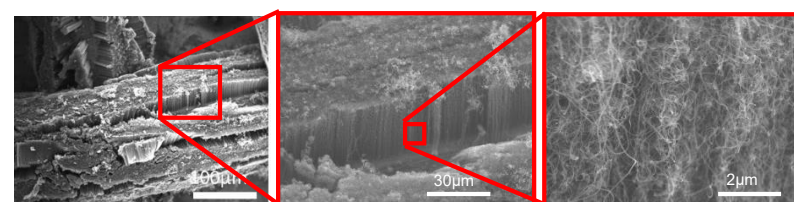


Shewanella algae



Synthesis of nanoparticles by algae => Application to catalyst (fuel cell, green process, etc.)

Synthesis of nanocarbons (nanotube, nanohorns)



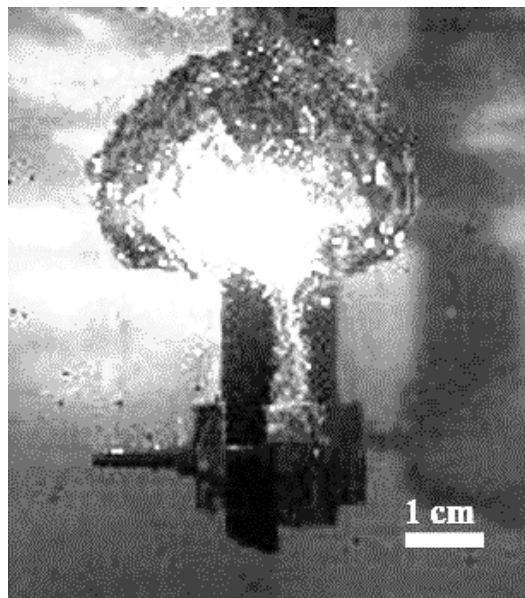
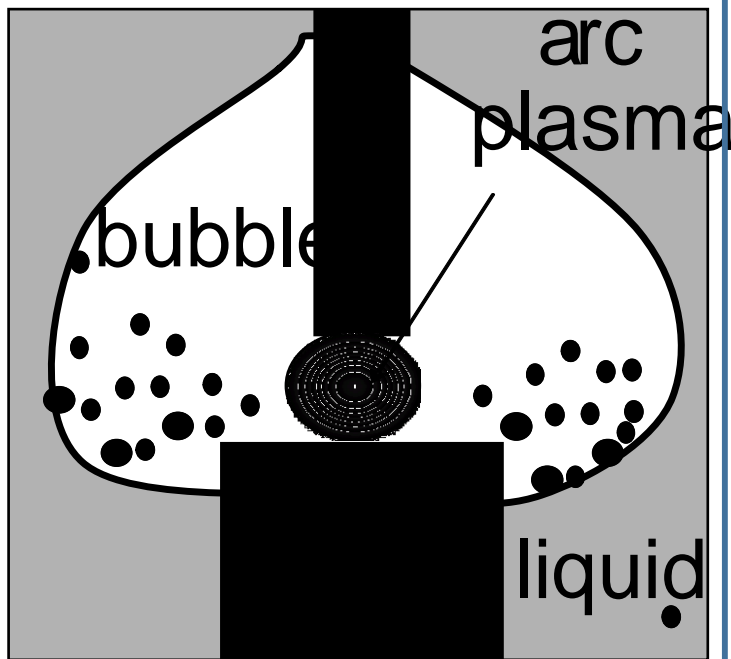
Kyoto U

Arc discharge (5000~10000°C !)

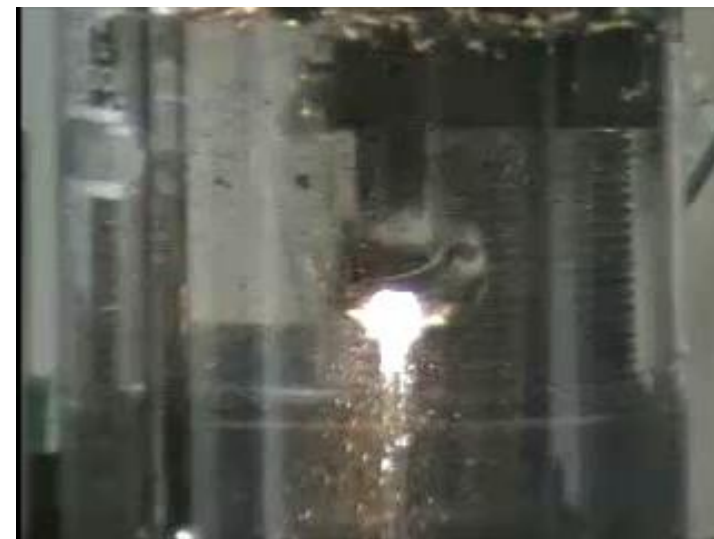
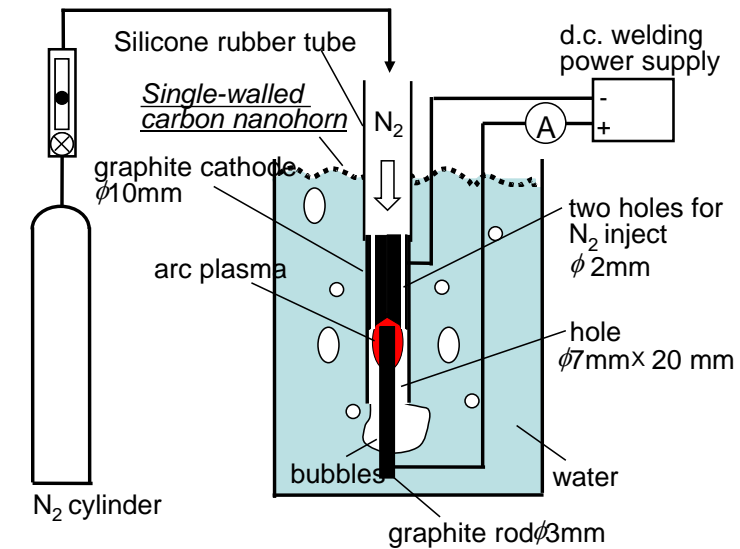
Arc discharge in liquid

⇒ Extreme temperature gap
can be easily made.

⇒ Unique structure can be
created!

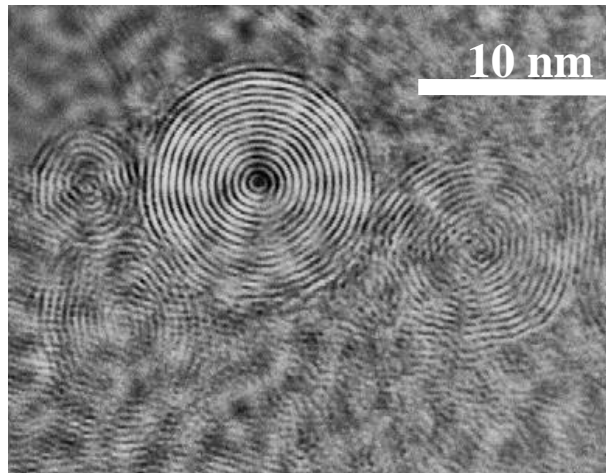
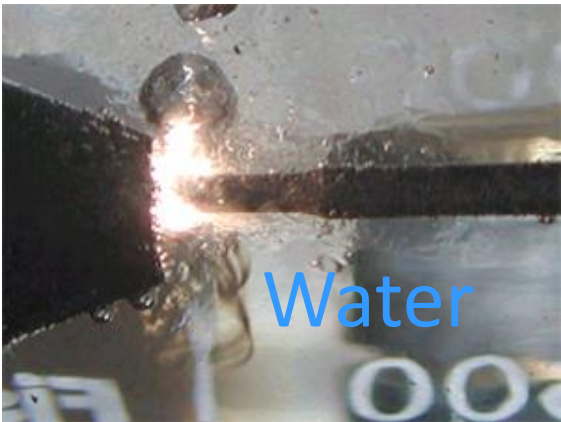


Arc discharge in liquid



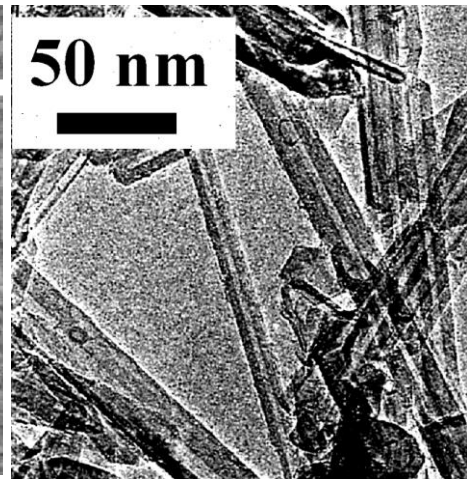
Arc discharge in liquid
with gas injection





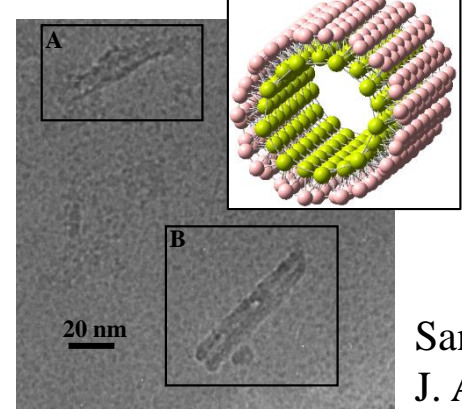
multi-shell fullerene

Sano, et al, Nature, 414, 507 (2001)



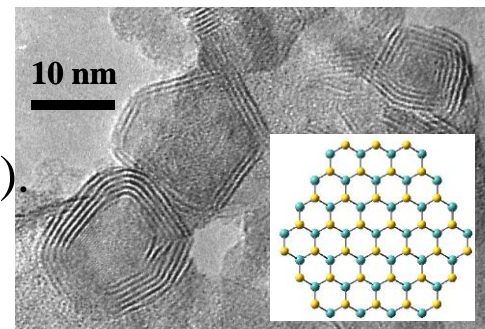
CNT

N. Sano, Carbon 42, 95 (2004).



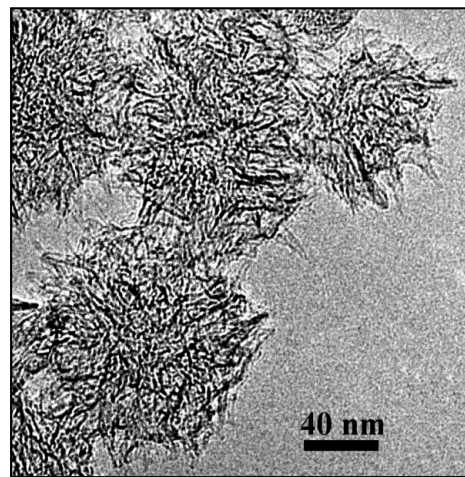
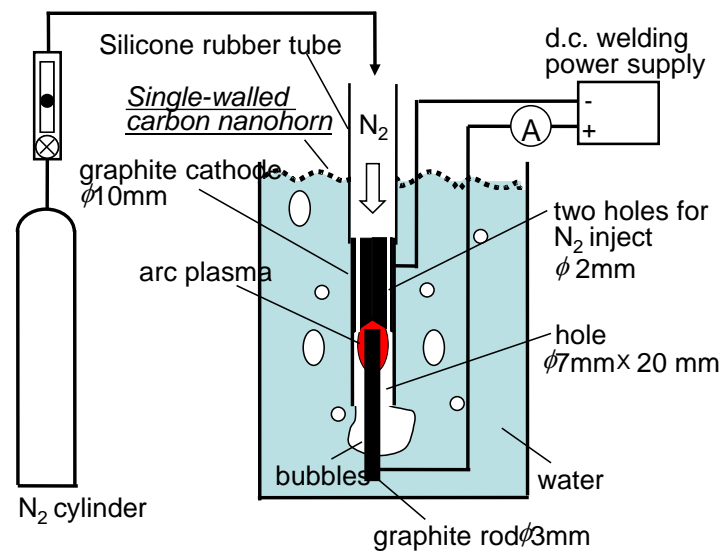
MgB₂ nanotube

Sano et al.,
J. Appl. Phys. (2011).

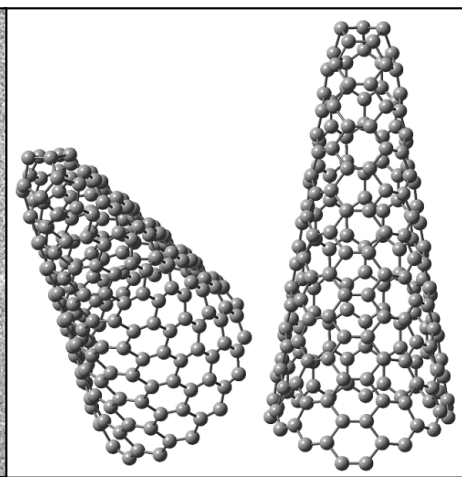


MoS₂ fullerene

N. Sano et al.,
Chem. Phys. Lett. 368, 331-337 (2003).

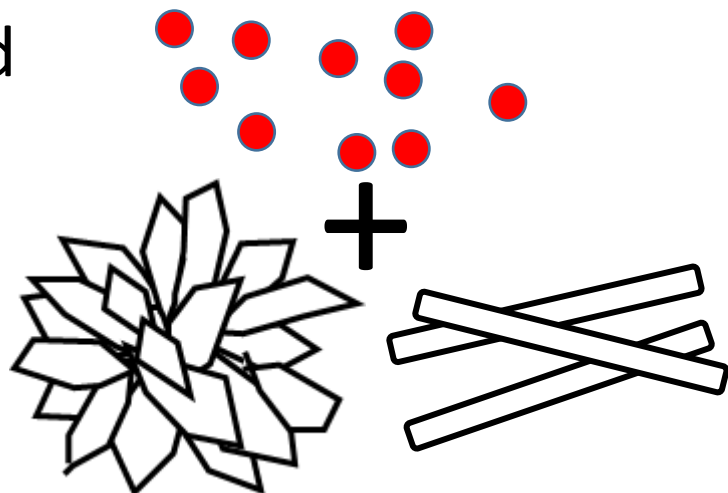


Carbon nanohorn (CNH)

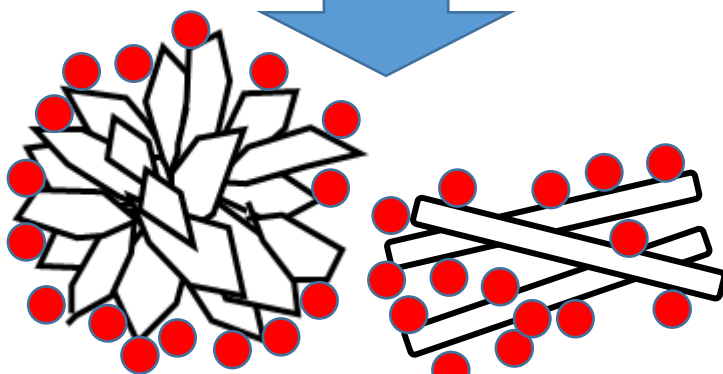


Unique metal-CN_H hybrid structures can be realized by GI-AIW method
(N also may be doped if N₂ is supplied.)

Conventional functionalization method



Fe are added on C surface by many ways.

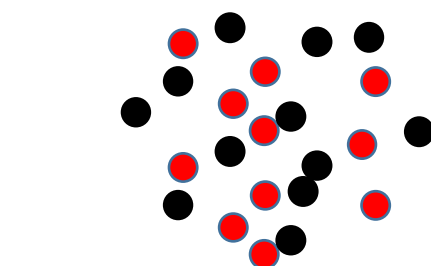
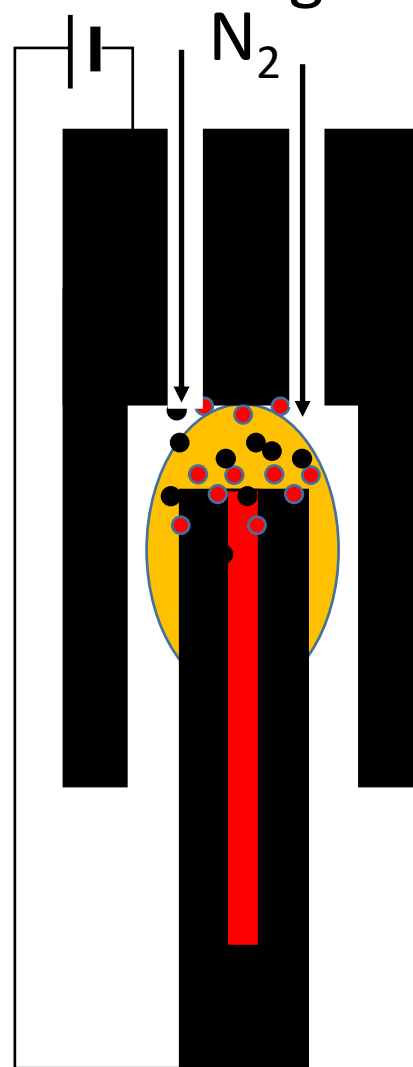


C nano surface are decorated with Fe on outside surface.

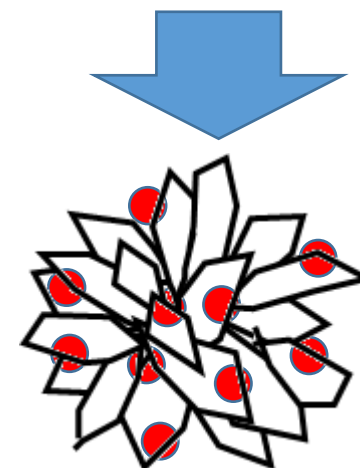
('outwall' structure)

Our functionalization method

=> higher catalytic activity is expected.



C and Fe evaporate and are solidified simultaneously.

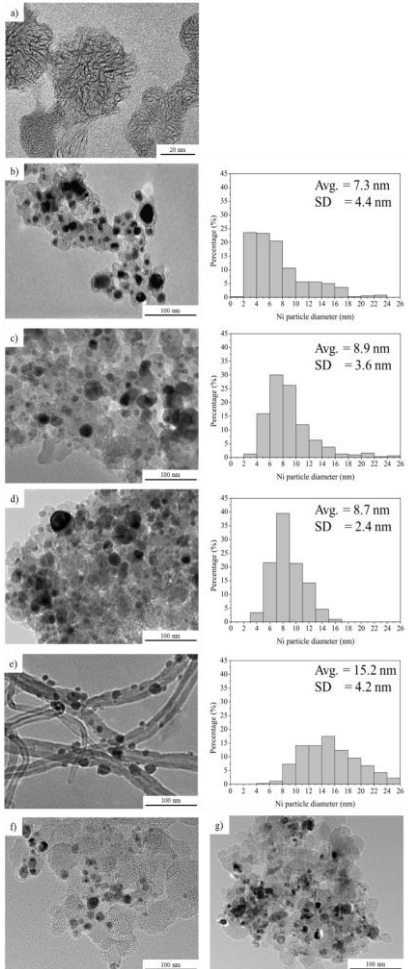


Fe nanoparticles can exist in carbon wall.

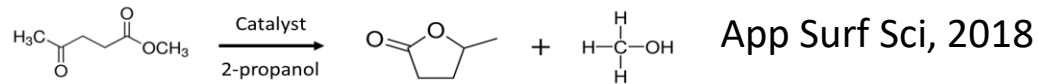
('inwall' structure.)

NANOTEC-CU/Kyoto

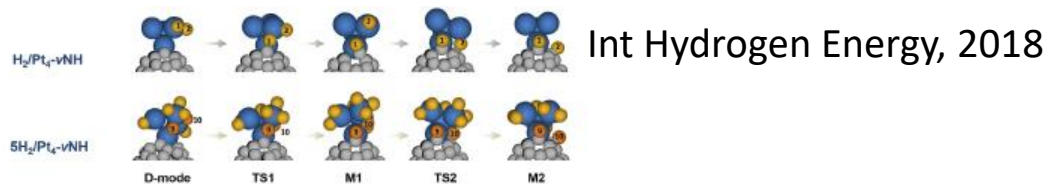
Carbon Nanohorns



Catalytic materials for biomass conversion to γ - valerolactone



H₂ storage materials



Electrocatalysts for H₂O₂ production

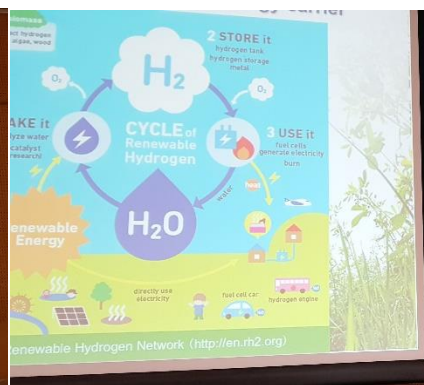
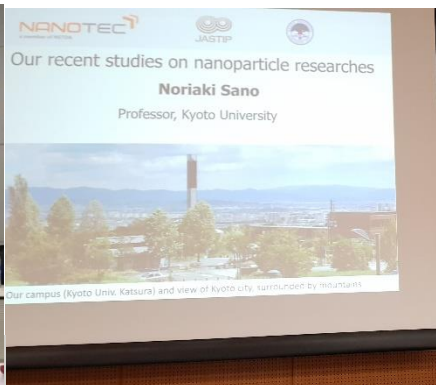
started in 2018, prelim data are positive

Scientific Output

- Int. Journal : 2 papers + 1 submitted
- Int. Conf.: 4 orals
- Two workshops
- 3 exchange researchers/students

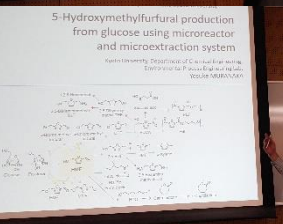


Workshop and Student/Researcher Exchange



Me

- ASAKURA, Hiroyuki (阿部 博之)
- April, 2012 - March, 2016
- Postdoctoral research assistant professor at Nagoya University, Japan (Nanotechnology Research Center, Institute for Materials and Chemical Process, Aichi Institute of Technology)
- April, 2016 -
- Present research assistant professor (Kyoto University)
- Present projects
- Ultraviolet catalysis
- Electrochemical catalysis (ORR, OER)
- Energy absorption/transportation



Electrocatalysis for Sustainable Energy and Environmental Applications

Hiroyuki Takagishi, Ph.D.

Nanotechnology for Energy & Catalysis Laboratory (NECL)

National Nanotechnology Center (NANOTEC)

National Science and Technology Development Agency (NSTDA)

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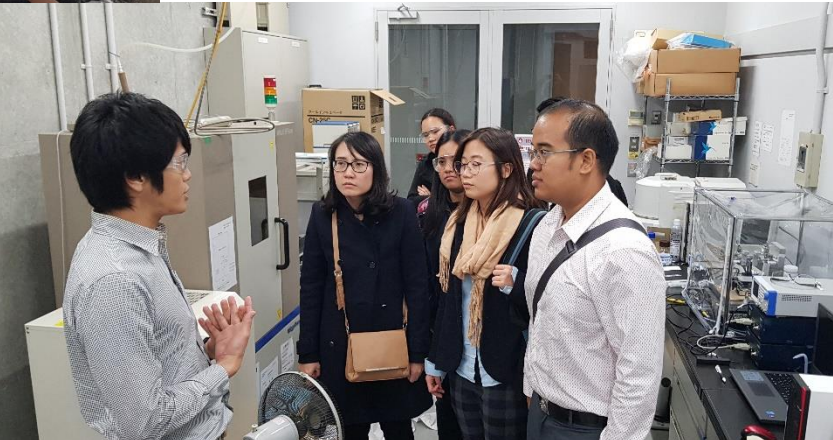
Molecular Simulation of Metal/Metal Oxide Catalysts for Energy Production

PUSSANA THIRUNIT

National Nanotechnology Center (NANOTEC)

Pathum Thani, Thailand

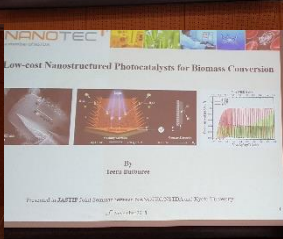
pussana@nanotec.or.th



Low-cost Nanostructured Photocatalysts for Hydrogen Conversion

By Izuru Yamamoto

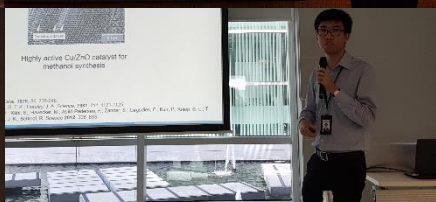
Presented at JST/JSTED Joint Meeting on Nanotechnology and Smart Energy Technology (2018-03-22)



Industries... the degree of aggregation of particles used greatly affects product quality.

Researcher: National Institute of Advanced Industrial Science and Technology (AIST)

Chemical reaction scheme showing the synthesis of methanol from CO and H₂.





Thank you.