

Photocatalysis International Research Center

TERMS : April 1st ,2013~March 31th,2021

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Yoshihisa Ohko Advanced Industrial Science and Technology,
 Senior Researcher

(Postdoctoral Fellow)

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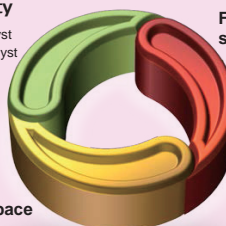
Purpose

Through basic and practical R&Ds of self-cleaning, environmental cleanup, and artificial photosynthesis, we aim to heave photocatalytic technology to a next stage.

Research themes

For eco-friendly society

- Polymer glass with photocatalyst
- Insulating paint with photocatalyst
- Highly efficient water splitting photocatalyst
- CO₂ to fuel process



For safe and healthy society

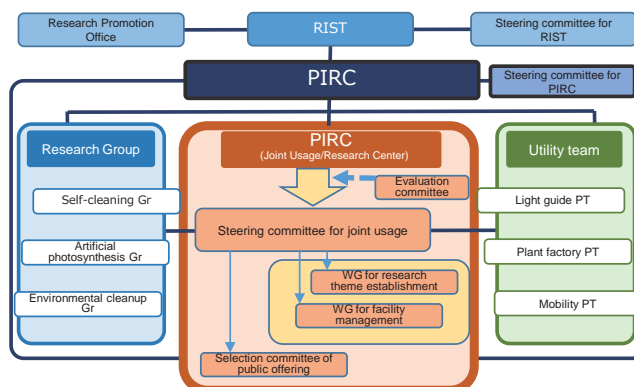
- Mobility application
- Sterilization for water/air purification
- Photocatalytic mosquito trap system
- Plant factory and production engineering of useful plant

For comfortable space

- Photocatalyst for interior treatments
- Light-guiding system to indoors

Present situation and future prospect

Based on the Joint Usage/Research Center authorized by MEXT, we reorganize PIRC for further development.



Research Highlight①

Studies on analyses of microbicidal mechanism of photocatalyst and its application

Identification of fungi occurring in cultural assets of Nikko Toshogu Shrine and analyses of bactericidal effect by photocatalyst



Nikko Toshogu Shrine



▲Sampling

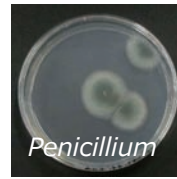


▲Blackening sites by fungi

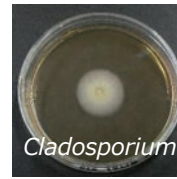
In order to protect the deterioration of decorative cultural assets, the fungal flora were analyzed as a basic research aiming for the fungi control of the cultural assets using the bactericidal effect of photocatalyst.

As the results, the fungi closely related to the genus *Penicillium* and the genus *Cladosporium* were confirmed by the culture method. In addition, the presence of the fungi included to the genus *Baudoinia* were confirmed by non-culture method.

▼*Baudoinia*



Penicillium



Cladosporium



Other Research Achievements (Microbicidal Mechanism Analyses)

Bacteria: The peptidoglycan layer promotes the bactericidal effect.

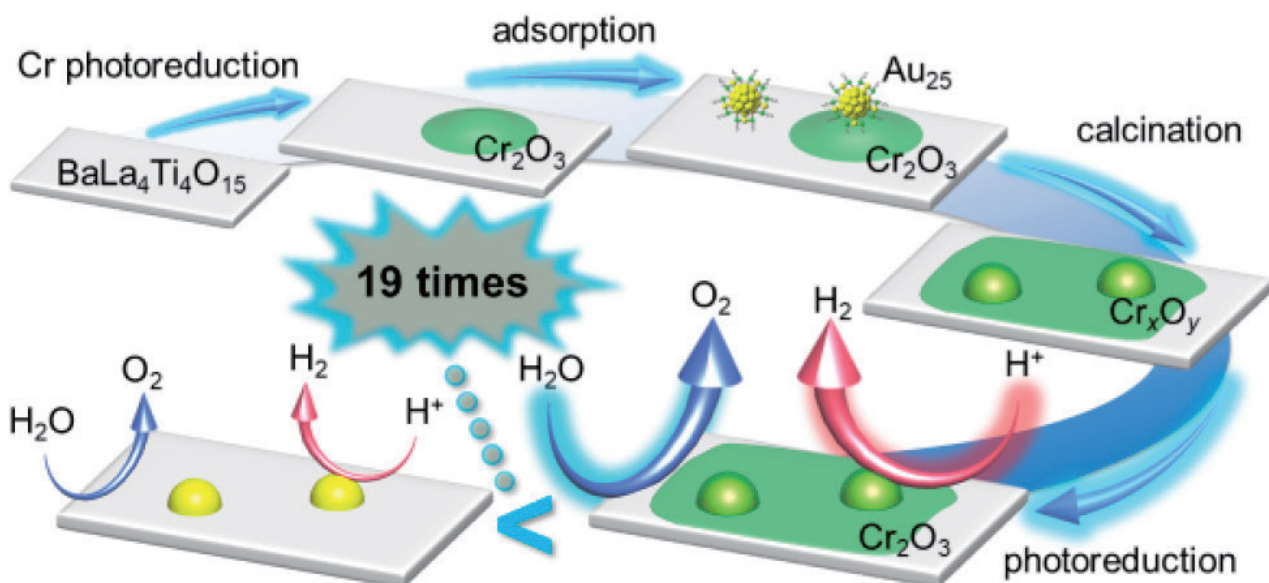
Fungi: The presence of melanin pigments suppresses the fungicidal effect.

Photocatalyst · BDD electrode combined wastewater treatment system: This system decomposed the organic matter without the burden on the environments and showed the bactericidal effect against *Escherichia coli* cells and *Bacillus subtilis* spores.

Research Highlight②

Enhanced activity of water-splitting photocatalyst by chromium oxide shell

Cr₂O₃ shell formation using SMSI



Y. Negishi, et al., *J. Phys. Chem. C*, 122, 13669 (2018)