FUJIMURA LAB.

Green Photonics using Metal Nanostructures

Guest Chair for Advanced Interdisciplinary Modeling

Modeling of Photonic Nanostructures

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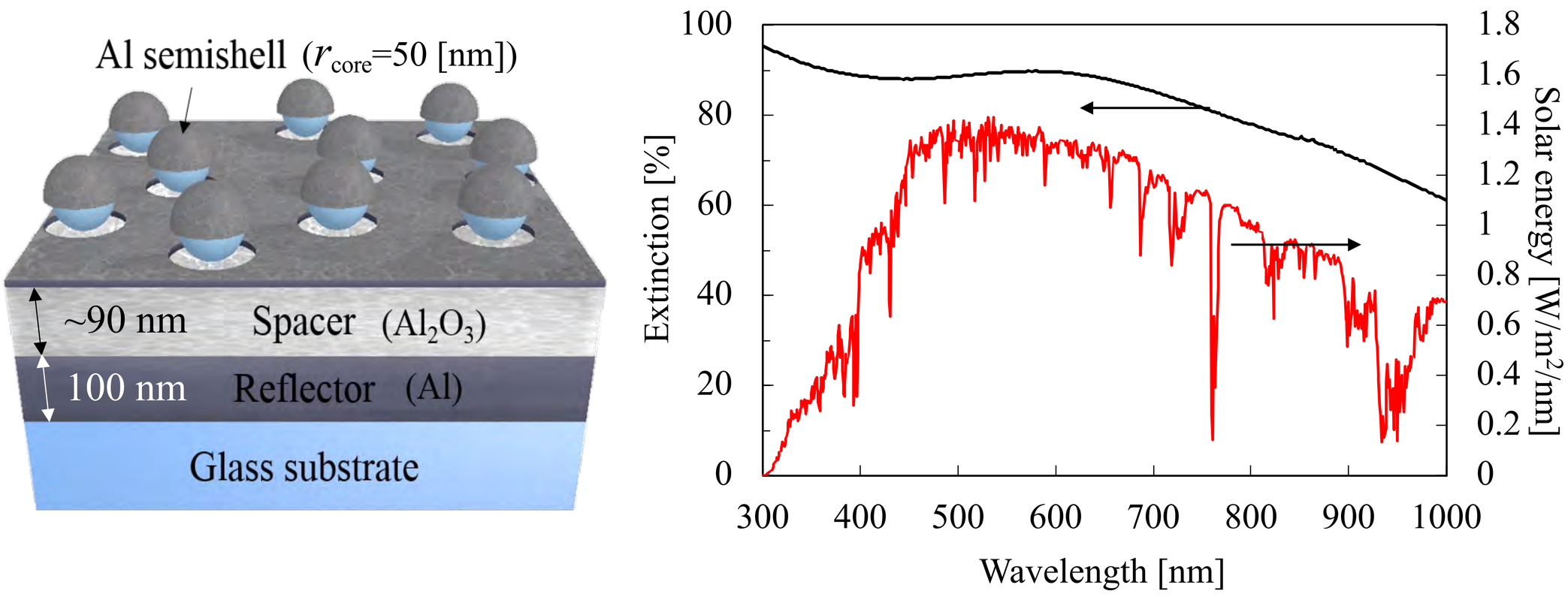
Japan imports most of its energy resources from overseas. Therefore, improving the energy self-sufficiency rate is very important by introducing renewable energy, such as solar power. In the guest chair for advanced interdisciplinary modeling, we are developing energy harvesting devices to extract energy from sunlight and waste heat, and designing nanostructures for the highly efficient generation of hydrogen from water using photocatalysts. The figure shows an example of the development of a broadband absorber that absorbs solar energy with high efficiency over a broad spectrum. The fabricated nanostructures have an average absorption rate of 83% over a wide spectral range from UV to NIR, and the absorption rate is almost independent of the angle of incidence and polarization. The Al-based nanostructures can be fabricated using the self-assembling phenomenon, making them inexpensive and enabling large-area fabrication. Such highly efficient broadband absorbers are expected to be used in Solar-Thermophotovoltaic (STPV) systems.



Multilayer metal nanostructures with Al-SiO_2 semi-shells and its optical absorption spectrum