Research Hotline

UPDATE FROM THE CUTTING EDGE

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The abstracts of the recent research information appearing in Vol.14 No.10-12 of "AIST TODAY" are introduced here, classified by research areas.
For inquiry about the full article, please contact the author via e-mail.

Environment and Energy

Achievement of ideal organic-solar-cell architecture
Improvement of photo conversion efficiency by controlling crystal structure

We have achieved construction of highly controlled organic-solar-cell architecture by means of a crystal growth technique. The technique known as heteroepitaxy was applied to the co-evaporation of donor and acceptor materials. The ideal film morphology with high crystallinity was achieved, where carriers can be transported smoothly. As a result, the solar-cell power conversion efficiency was doubled from 1.85 % to 4.15 %. Further improvement of organic solar cells will accelerate the realization of flexible and low-cost solar panels.

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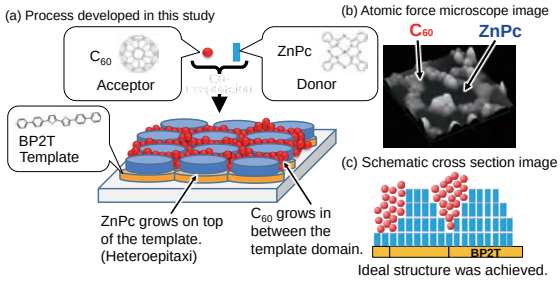

Detail of process and the structure of bulk heterojunction
(a) The process developed in this study
(b) An atomic force microscopy image of the co-evaporated film (10-nm thick)
The phase separated structure was constructed by molecular interactions.
(c) A schematic illustration of the cross-section of a film

Environment and Energy

Effectively synthesizing a key raw material of the silicon chemical industry
A one step synthesis of tetraalkoxysilane from silica and alcohol

Tetraalkoxysilane is a key raw material of the silicon chemical industry and a promising raw material for silicone and other various organic silicon materials. We developed a technology capable of efficiently synthesizing tetraalkoxysilane through a one-step reaction between alcohol and silica, the primary constituent of sand. We discovered that tetraalkoxysilane could be obtained in one step by adding an organic dehydrating agent to the reaction system of silica and alcohol to remove the water by-product. Also, the efficiency of the reaction was further increased by performing it in the presence of carbon dioxide and catalysts, metal alkoxide and alkali metal hydride. This technology paves a new path to the energy-efficient, low-cost manufacture of organic silicon raw materials from sand.

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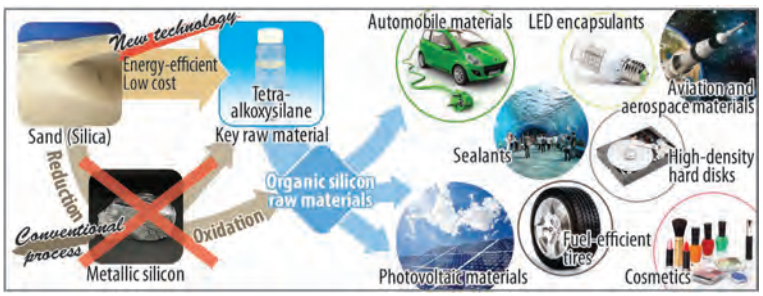

Manufacture of organic silicon raw materials from sand and diverse product groups containing organic silicon