Research Hotline

UPDATE FROM THE CUTTING EDGE

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The abstracts of the recent research information appearing in Vol.14 No.1-3 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

Efficient production of high-performance surfactants from non-edible biomass

Production cost reduction of biomass-based chemicals, avoiding competition with food production

We have succeeded in producing highly functional biosurfactants directly from non-edible biomass, mahua oil, by a fermentation process using yeast, and also in establishing the technology for their inexpensive mass supply by optimizing the fermentation conditions and the method of product separation. These biosurfactants, which not only have excellent detergency at low concentrations but also exhibit high biodegradability, are expected to be used in toiletry products such as environmentally friendly detergents and shampoos.

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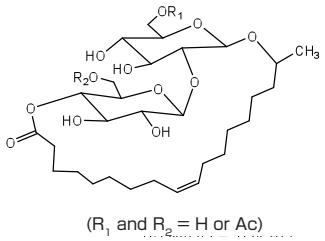

Structure of biosurfactants

	CMC (M)	γ_{CMC} (mN/m)
Biosurfactants	1.4×10^{-5}	32.3
Synthetic surfactant (LAS)	1.6×10^{-3}	34.0

Surface activities of the biosurfactants
The critical micelle concentration (CMC) is the standard for assessing the performance of surface-active agents. γ_{CMC} is the surface tension value at CMC.

Environment and Energy

Low Vf and highly reliable 16 kV ultrahigh voltage SiC flip-type n-channel implantation and epitaxial IGBT

Effective use of electricity, promotion of saving energy

Flip-type n-channel implantation and epitaxial (IE)-IGBT on 4H-SiC carbon face with an epitaxial p^{++} collector layer was investigated. In this study, we employed the epitaxial p^{++} layer as a substrate and the IEMOSFET as a MOSFET structure with an original wet gate oxidation method, to realize high channel mobility. We were able to achieve an ultrahigh blocking voltage of more than 16 kV, extremely low forward voltage drop of 5 V at 100 A/cm^2 and small threshold voltage shift (< 0.1 V). These characteristics are useful for Smart Grid and HVDC systems, the use of which would realize a low carbon emission society.

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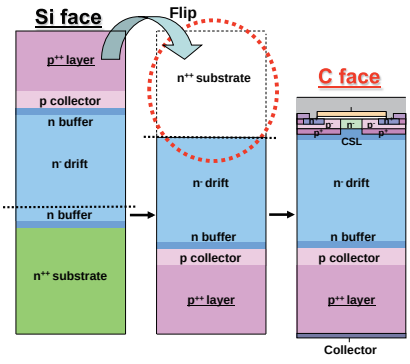
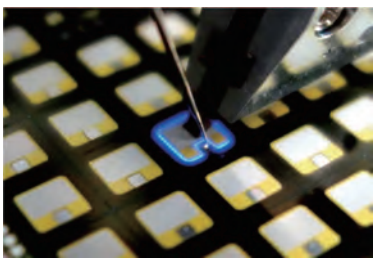


Fabrication process flow of filp-type IE-IGBT on 4H-SiC (000-1) carbon face



Recombination radiation of IE-IGBT steady on-state