Research Hotline

UPDATE FROM THE CUTTING EDGE

Apr.-Jun. 2012

The abstracts of the recent research information appearing in Vol.12 No.4-6 of "AIST TODAY" are introduced here, classified by research areas.
For inquiries about the full article, please contact the author via e-mail.

Environment and Energy

An oxygen gas barrier film that self-repairs minor damages
Development of a food packaging film using clay

We have developed a transparent film with a high gas barrier property by applying a mixed paste of hydrophilic clay and a water soluble plastic on a polyethylene telephthalate (PET) film. In addition to the flexibility of the gas barrier layer, this film self-repairs pin holes caused by deformation because it absorbs water vapor in the air and swells. Accordingly, the oxygen gas barrier property of the film deteriorates less easily than conventional products when it is damaged.

Moreover, we have established the technology to apply the paste quickly onto a film by printing and succeeded in the production of rolls 50 cm in width. The developed film is promising as a food packaging film since forming polypropylene layer on the film made it easy to make the film into a bag and to print the letters on its surface.

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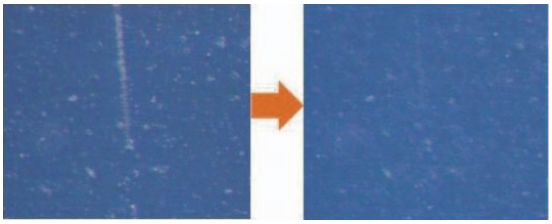
AIST TODAY Vol.12 No.5 p.10 (2012)

Optical microscope images (height 0.50 mm, width 0.62 mm) of the self-repairing process of the scratched gas barrier layer
left: just after being scratched, right: after being left for 60 minutes in humidity



Life Science and Biotechnology

Discovery of non-translational role in the ribosome
Specific inhibition of Ribonuclease T2 by helix41 of 16S rRNA

AIST has discovered that the ribosomes have a function of inhibiting the activity of a ribonuclease (RNase) T2. Ribosomes play a major role in the “translation” of genetic information to protein. RNase T2 is an RNA-degrading enzyme, which is involved in the inhibition of extracellular RNA invasion. In *E. coli*, RNase T2 is present in the periplasmic layer and is isolated from intracellular RNA. However, RNase T2 enters cells and self-RNA can be degraded during the stationary phase or under stress. Accordingly, cells need a mechanism for protecting RNA from RNase T2. Through mutation analysis of 16S rRNA, it has been discovered that an inhibition-determining site exists in 16S rRNA in a 30S ribosomal subunit and prevents intracellular self-RNA degradation by sequestering RNase T2.

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AIST TODAY Vol.12 No.6 p.20 (2012)

Evaluation of activity of inhibiting RNase T2 using intracellular RNA degradation as an index (lane 1 (KT103/Eco), lane 2 (KT103/Rpi), and lane 3 (KT103 *rna*-/Rpi))
RNA degradation (lack of bands indicating 23S rRNA and 16S rRNA) is seen in lane 2 (KT103/Rpi). KT103 *rna*- is the strain that lacks RNase T2 in the genome and shows no RNA degradation irrespective of the origins of helix41.