<Toray IR Seminar - No.4>

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Research and Development Activities at Toray Industries Inc.

- Business Expansion by Advanced Materials -

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Organization of Toray Industries, Inc.



R&D Expenditure and Personnel

-Consolidated-



New Organization of R&D Division





Operating Income for FY Mar/2005

ransformation into a "New Value Creator" for the 21st Century

TORAY

R&D Innovation based on NT21



Principal policies for Toray's R&D

Stepping up of R&D innovation to promote business expansion through production of advanced materials

- 1. R&D strategy in line with the company's long-term vision
- 2. Development of advanced technology fields through technology integration
- 3. Challenge to develop creative/original technologies through pursuit of technological limits
- 4. Speed-up by focusing on research areas, and through collaboration with other organizations
- 5. New value creation through market and business model research



"NT21": R&D Innovation Key



Advanced Materials



Features of Toray's R&D



Toray's Activities for Advanced Materials

Advanced Materials

Toray's Activities for Advanced Materials

Advanced Materials

Nanotechnology in Foundation Business

Nanofibers

Toray has succeeded in creating nanofibers, integrating advanced fiber technology, and creating nanostructure control technology

<Features of nanofibers>

- + Larger surface area leads to excellent adsorption properties
- + Can be applied to commodity polymers such as nylon and polyester
- + Conventional equipment can be used for commercial production

Nano Multi-Layer Film

Features

•Multi-layer with the thickness of molecular size order

New Technology

-The development of new device for multi-layer

Properties

Properties	"New	Lumirror*
Haze(%)	1.0	1.9
Tear Strength(N/mm)	300	10
Falling ball test (BS5544)	0	Δ

Nano Alloy Polymer

Nano alloy was produced by control of interaction between interface

Superiority

Properties	Nano Alloy PLA+Polymer A	PLA
Relative Rate of Crystalization (at 130 °C)	40	1
Heat Resistance	115	55
Retention of Strength (%) (120c °C)	74	27

Application of PLA Fiber for Automobile Parts

Application of biodegradable PLA Fiber produced by renewable resources for automobile parts

Breakthrough technology

Improvement of 1- durability , and 2 - friction fastness under high temperature and high moisture

2. Selection of lubricants to improve abrasion resistance

Automobiles

Parts	Model
Optional matte	TOYOTA/ RAUM, PRIUS (2003)
Spare tire cover	TOYOTA/ RAUM (2003)
Line matte, Seat surface, Door trim,	Under examination (2004 -)
Ceiling materials	

Toray's Activities for Advanced Materials

Advanced Materials

Strategy for Advanced Electronic Circuit Materials

Strategy for Display Field

Display	LCD	PDP	OLED	FED
	HARTER		Emission	Electron Gun(CNT)
Products		Panel	Panel (under development)	
Components	Color Filters Anti-reflective films Diffusing Sheet Reflective Sheet	Anti-reflective Films (under development)		
Materials	Color Paste Resin Black Matrix White PET Films	Paste	Insulation Materials Emitting Materials (under development)	Carbon Nanotubes (under development)
Equipments	Slit-die Coater			

New higher performance technologies are the root of product competitiveness. (ex. Nano-dispersion, Nano-materials)

Recent Accomplishments in LCD Fields

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Recent Accomplishments in PDP & Organic EL Fields

Toray's Activities for Advanced Materials

Advanced Materials

Expansion of Composite Materials for Aircraft Structures

Improvement of carbon fiber properties expands aircraft applications

Development of Composite Materials for Automobile Structure

Technologies and Recent Progress of Membranes for Water Treatment

PVDF Hollow Fiber Microfiltration Membrane for Drinking Water Production

Development of chemically stable PVDF membranes by proprietary spinning technology

PVDF: poly(vinylidene fluoride)

Toray's Activities for Advanced Materials

Advanced Materials

Drug Delivery System

Novel DNA Chip for Diagnosis

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Carbon Nanotubes (CNT)

Control of Zeolites and Metal Catalysts

Selective Synthesis of SWNT and DWNT

CCVD method using Zeolites (<u>Catalyst-supported</u> <u>Chemical</u> <u>Vapor</u> <u>Deposition</u>)

Diameter : ~2 nm

DWNT

Diameter :3~6 nm

- **1. Vacuum Fluorescent Displays**
- 2. Field Emission Displays
- 3. Support of Catalyst for Fuel Cells
- 4. Polymer Additives

"NT21": R&D Innovation Key

Advanced Materials

TORAY

Quicker and More Strategic

Concentration of comprehensive corporate power from early stage • R&D theme generation

Toray Research Center (TRC)

(Technical Dept., Marketing Dept., Engineering Div. etc.)

Expansion of Research Function to China

Construction of R&D centers that cover basic polymer research to fibers & textiles development (Nantong • Shanghai)

Business Expansion by Advanced Materials

Descriptions of predicted business results, projections and business plans contained in this material are based on assumptions and forecasts regarding the future business environment, made at the present time.

The material in this presentation is not a guarantee of the Company's future business performance.

