Emerging Applications of Radiation Processing using EB

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International Atomic Energy Agency Scientific Forum

ATOMS IN INDUSTRY

Radiation Technology for Development

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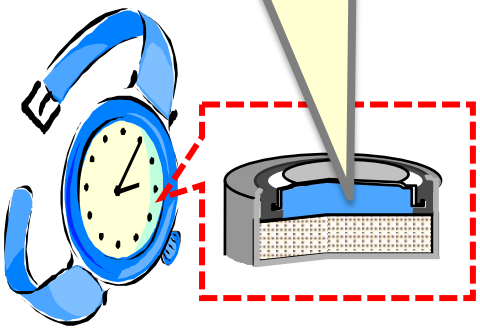
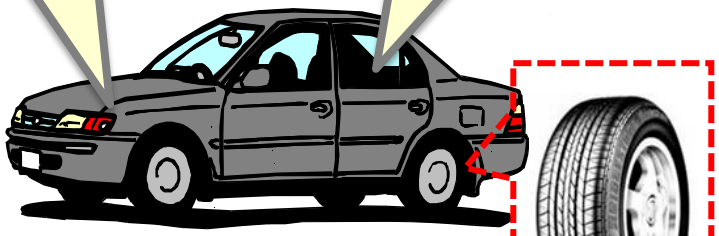
Radiation Processing in Daily life

Separator Membrane for Button Battery



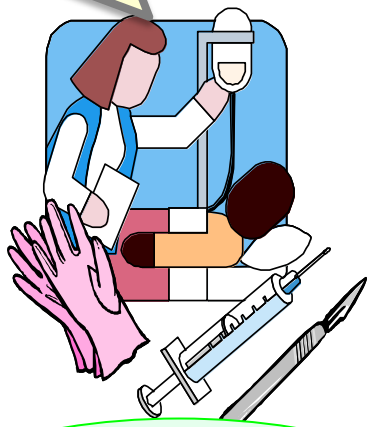
Heat Resistant Cable

Thermally Stable Polymer Foam Sheet



Radial Tire

Sterilization of Medical products



Adding electrical property

Improving thermal and mechanical properties

Mass processing without toxic chemicals

Commercialized by satisfying Needs

Keys for Technology Transfer

1. Needs of End users

Matching with seed technology in Radiation processing

2. Utilization of Advantages of Radiation Processing

Following reactions were not realized by Chemical process

- Modification of commercial product >>> Versatile applications
- Homogeneous reaction in whole material >>> Uniform processing
- No contamination of catalyst >>> Clean product

3. Economically feasible materials

High cost performance materials

- High performance products
- Effective production process

Effective processing with EB

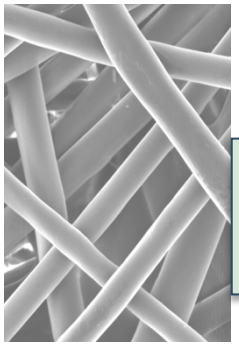
	Electron beam	Gamma ray	
Generation	Electrically accelerated electron	Radioactive decay of Co-60	Easy operation Electrically On-OFF
Maximum dose rate	Some hundreds kGy/s	20 kGy/h	High processing rate Mass production
Penetrating Power	Low	High	Idea of Material shape

3.6×10^4 times

High performance adsorbent

Nonwoven fabric
18 μm in diameter

equivalent to 90 μm thick water



250 keV EB

Graft polymeri-zation

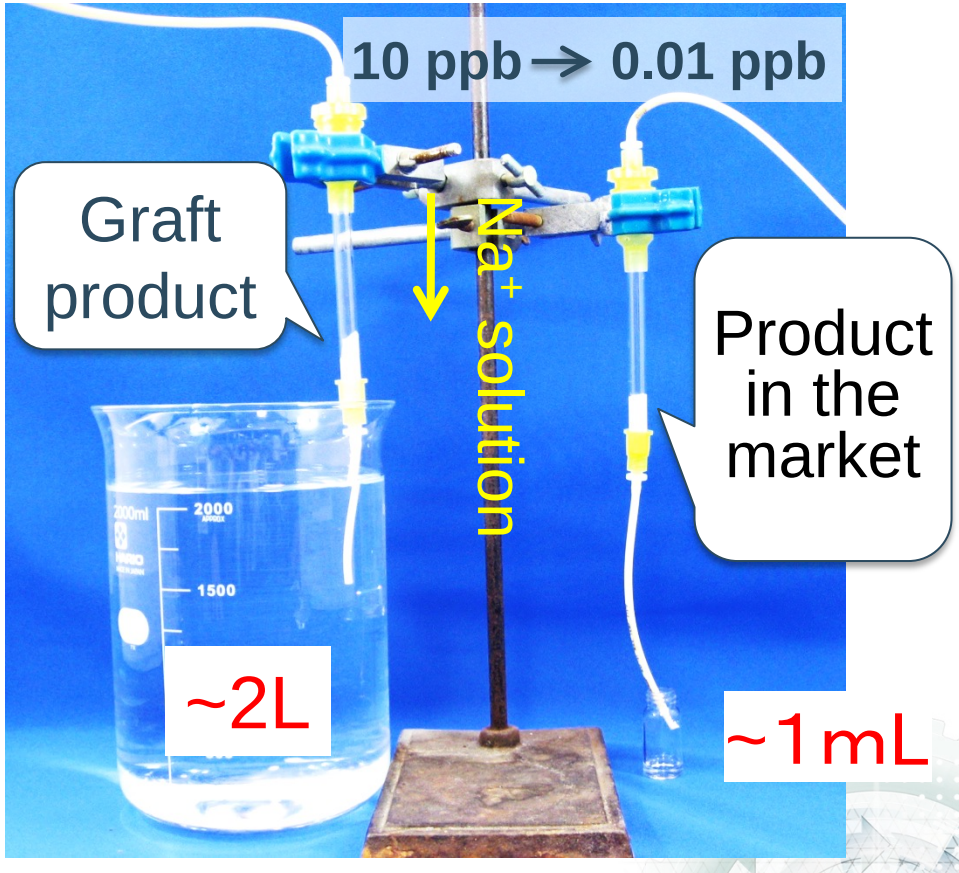
Metal-adsorbent fabric

Purification of washing agent for Silicon wafer

Removal of Cesium in Tap water

Swift Purification

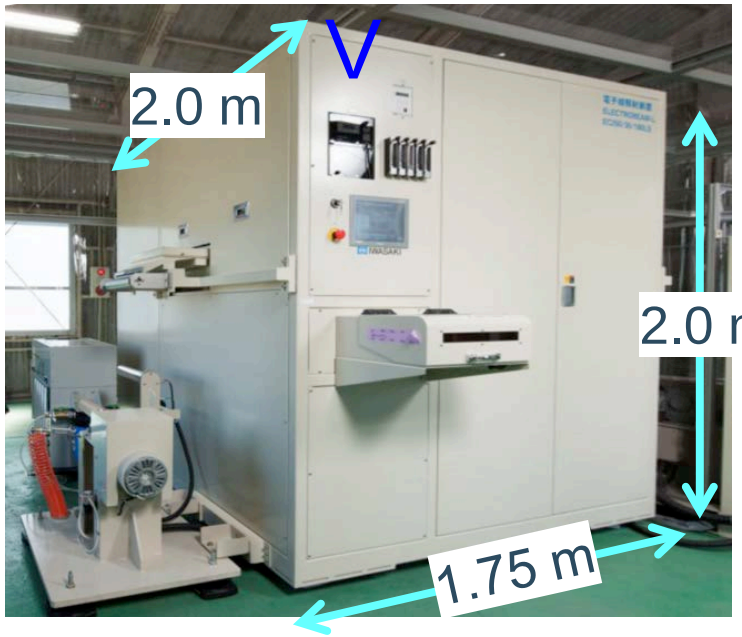
Filtration in 30 min



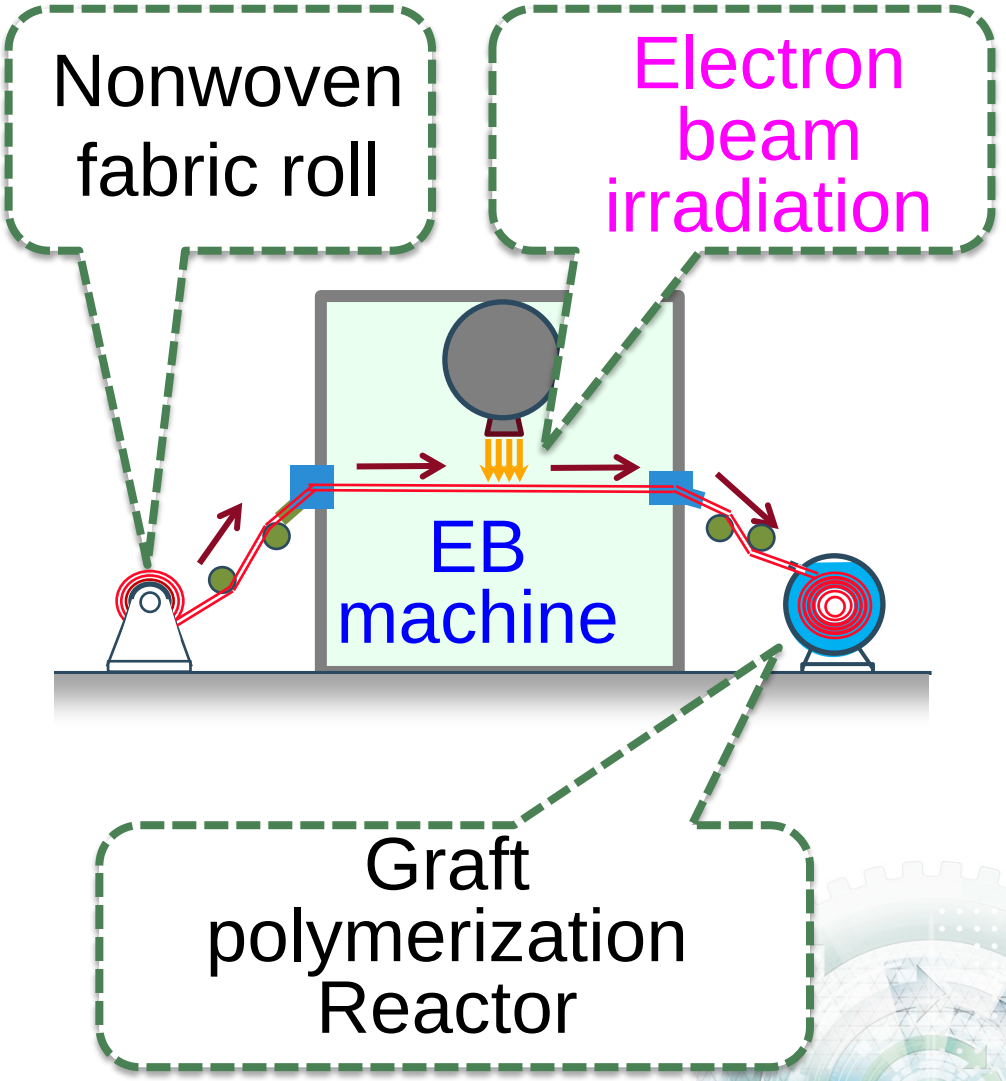
2,000 times faster

Low energy EB grafting

EB machine 250 kV



Compact size,
Self shielded and
Rational cost



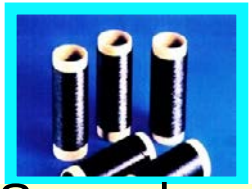
Versatile Applications using EB

Crosslinking

heat-resisting cable

Radial tire

Polyethylene foam sheet

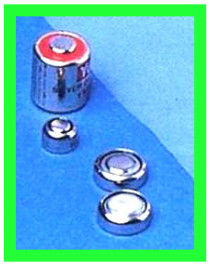


Super-heat resistance SiC fiber

Wound dressing

Washi lampshade

Graft polymerization



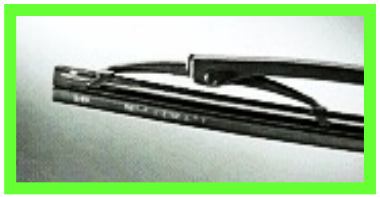
Button battery

Filter for ultra pure chemicals

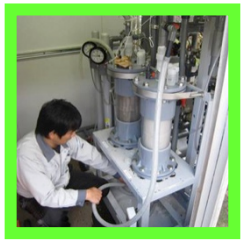
Removal of Cesium in water

Promising applications

Bio-degradable dummy lens



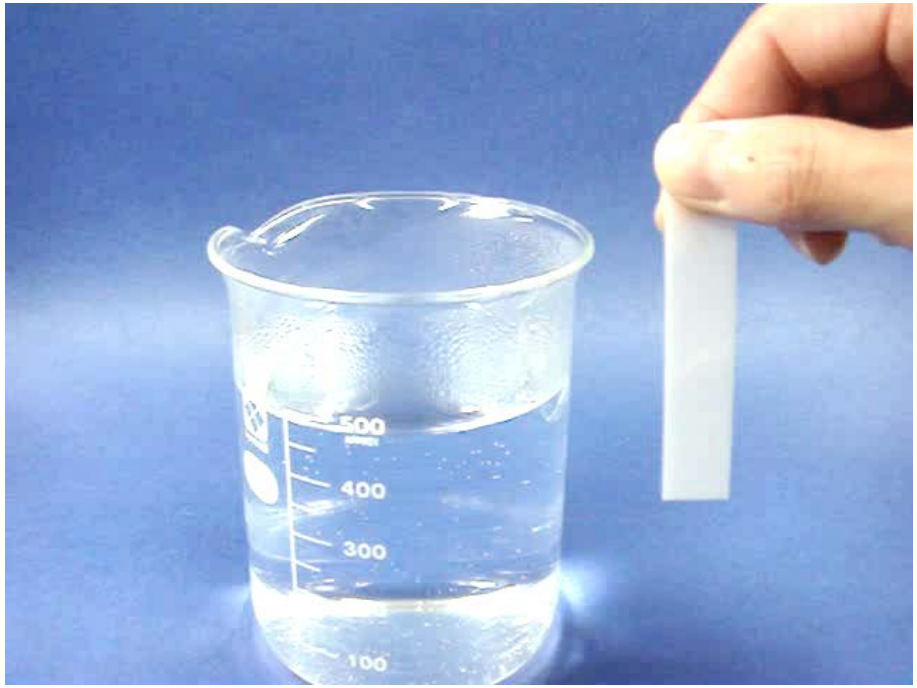
High performance wiper blade



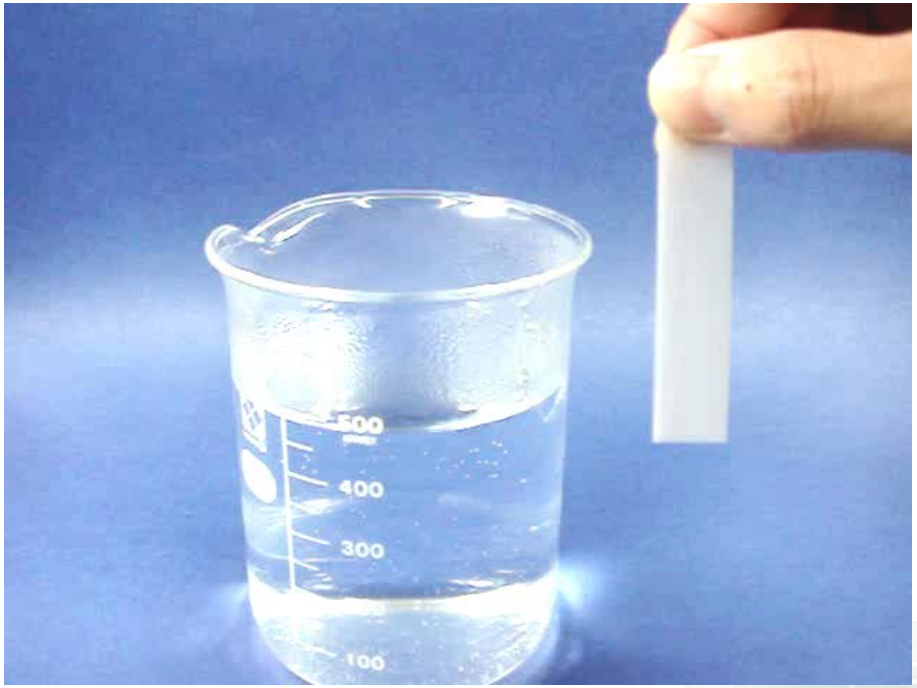
Extraction of Rare Metal from hot spring water

Demonstration of Crosslinking effect

We can see ”Shape memory effect induced by Radiation-Crosslinking “



Non-crosslinked



Crosslinked by EB irradiation

School Teaching Material

Shape memory plastic film can be used for studying "radiation-induced crosslinking effect“

Non-crosslinked

Crosslinked by EB irradiation

Film is easily treated by EB irradiation

Dip into hot water around 60 ºC

Commercialized in April, 2015

Thank you for your attention !