

Breakout Session 5

Materials Application

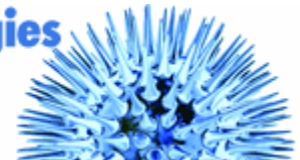
Steve Freiman (VAMAS)
Shingo Ichimura (ISO/ TC229)



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Summary of the discussion

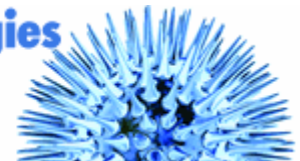
- Materials applications of nanotechnology covers various industrial fields.
- Discussion was focused on, at first, to list up **practical application fields** of nanotechnology, and to list up **physical and chemical parameters** to be measured in each application field.
- The items of “**size, shape, thickness, surface/interface composition, composition/purity, solubility, and adhesion**” were listed as typical examples of important phys. & chem. parameters. (Next Table)
- Further prioritization of the parameters was considered to be difficult since the importance of each item differs largely depending on final product.



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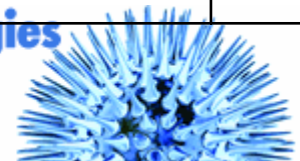
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Application fields

Physical/ Chemical parameters to be measured

	Size	Shape	Thickness	Surface/Interface comp.	Comp. Purity	Solubility	Adhesion
Photovoltaic	X	X	X	XX	X		X
Energy/Batteries	X	X	X	X	X		
Emulsion/Surfactant	X			X	X	X	
Catalysis	X	X		XX	X		
Corrosion inhibitors			X	X		X	X
Quantum dots	XX	X		X	X		X
Filters	X						X
Films Coating			X	X	X		XX
Fillers		X		X	X	X	X
Paints/Coatings	X		X	X	X	X	XX
Composites	X	X	X	X	X		X
Sensors			X	X			
Cosmetics	X	X		X	X		
MEMS/NEMS			X	X			X
Concrete	X	X			X		
	ISO/TC24/T C201, ASTM/E29	ISO/TC24, TC201, ASTM E29	ISO/TC202	ISO/TC201, ASTM/E42			ISO/TC206



Summary of the discussion (continued)

- **Standard documents exist, but cover only limited area. Some of standard organization relating to documentation were also listed.**
- **Additional comment was that new functions realized by nanotechnology may not relate directly to the parameters in some application products.**
- **OECD foundation data set of physical-chemical characterization of materials characterization was also discussed to consider possible prioritization of parameters. Common opinion from the floor was that the parameters are still out of focus from the materials application fields.**



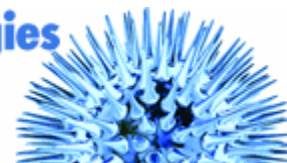


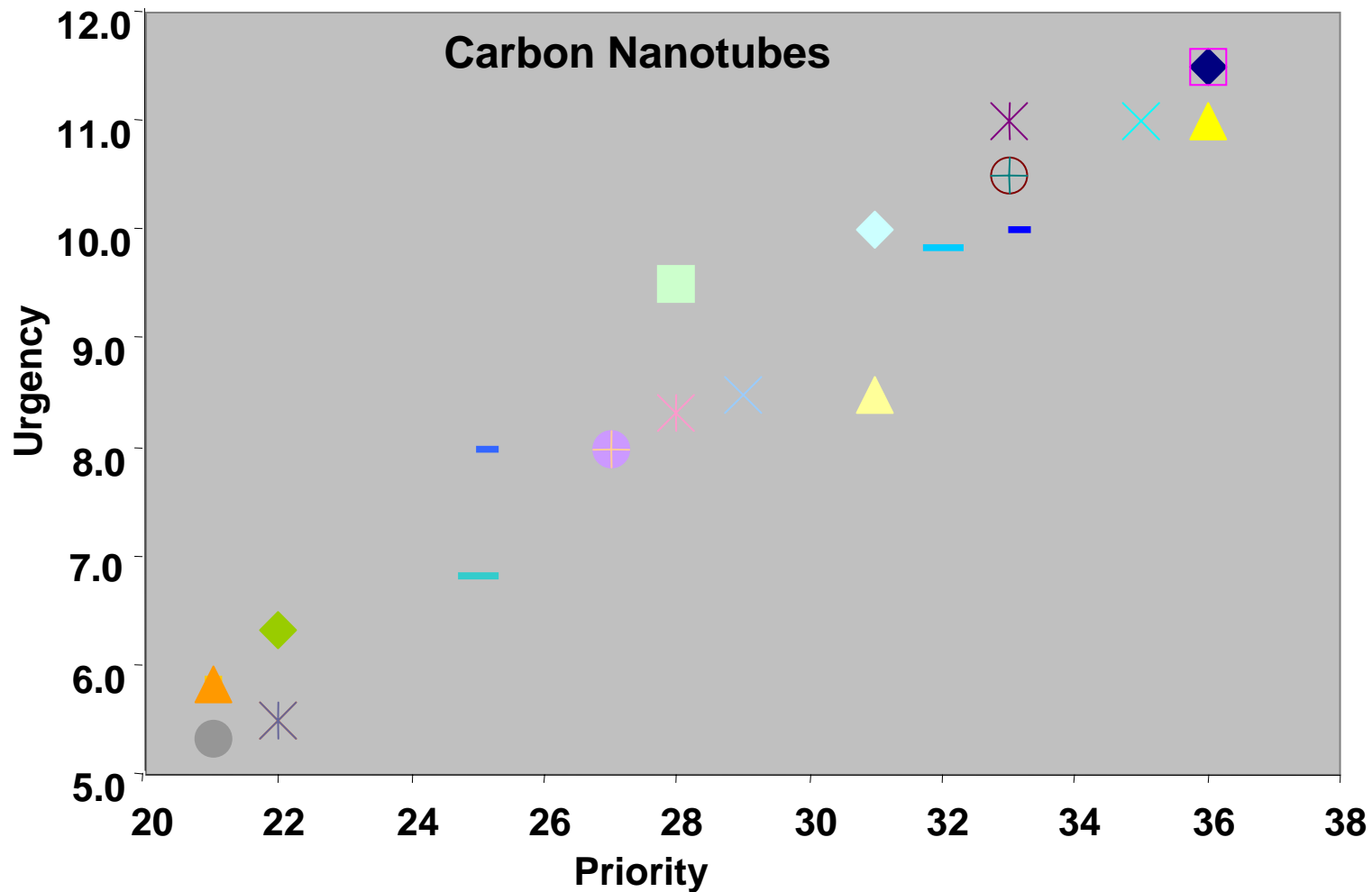
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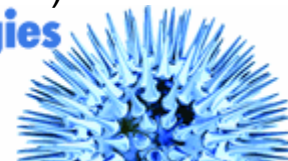
- ◆ Inhalation testing (WG3)
- ◻ Toxicology testing (WG3)
- ▲ Exposure determination – ambient air (WG3)
- ✕ Safe handling (WG3)
- ✖ Diameter distribution (WG2)
- Sampling methods for characterization (WG2)
- + Exposure determination – water (WG3)
- Length distribution (WG2)

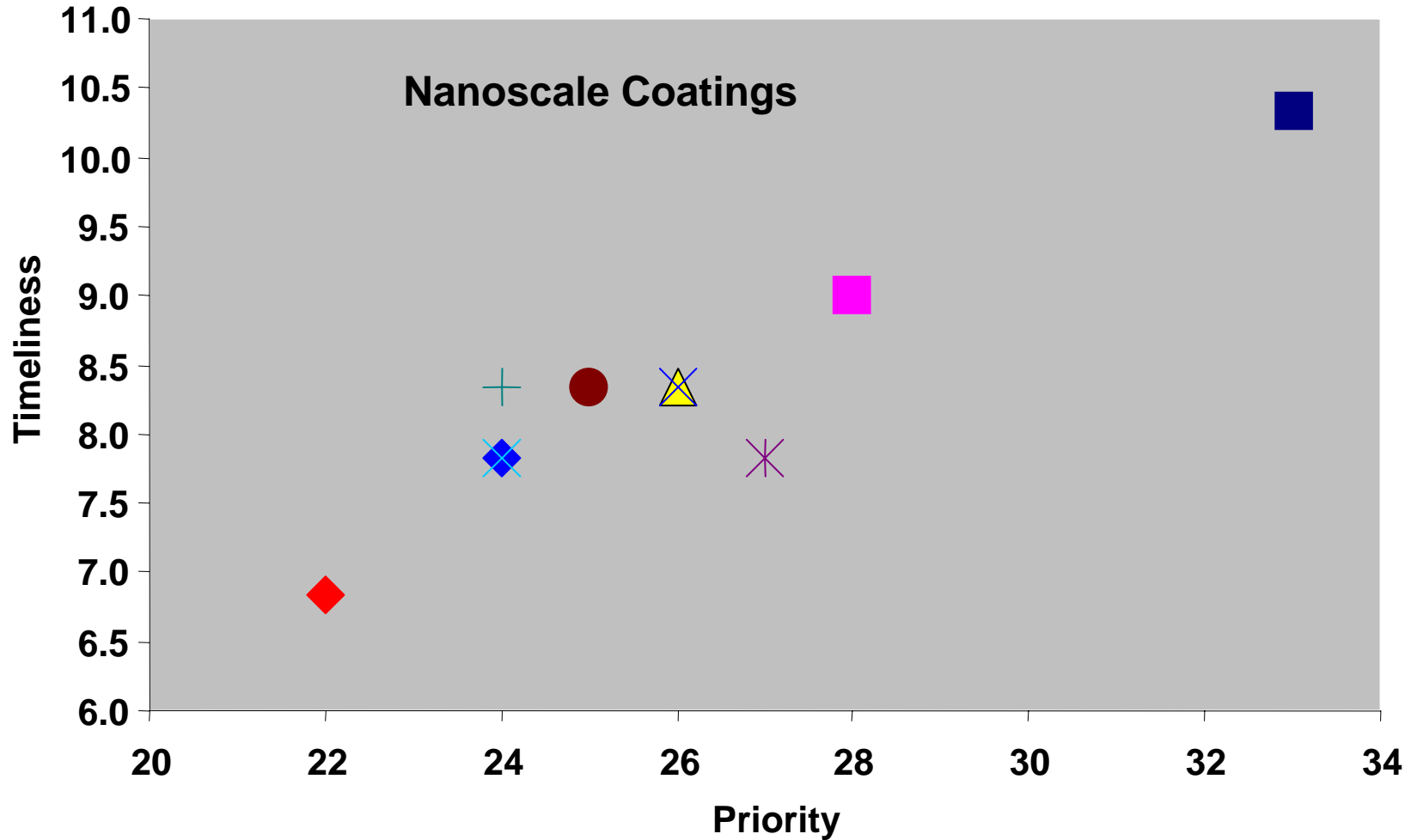


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■ Thickness

■ Scratch resistance

▲ Friction coefficient

× Ageing / particles release

× Porosity

● Physical properties - optical

+ Physical properties - mechanical

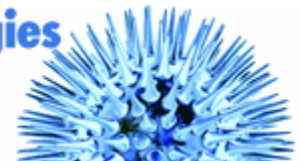
◆ Barrier properties



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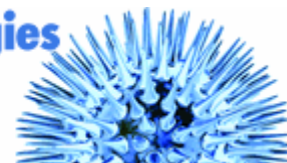


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- **Physical-Chemical Properties and Material Characterization**

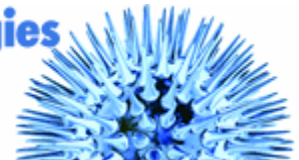
- Agglomeration/aggregation
- Water solubility
- Crystalline phase
- Dustiness
- Crystallite size
- Representative TEM picture(s)
- Particle size distribution
- Specific surface area
- Zeta potential (surface charge)
- Surface chemistry (where appropriate)
- Photocatalytic activity
- Pour density
- Porosity
- Octanol-water partition coefficient, where relevant
- Redox potential
- Radical formation potential
- Other relevant information (where available)



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OECD Foundation Data Set

Physical-Chemical Properties and Material Characterization

(Necessary for toxicity test/biological assessment)

- Agglomeration/aggregation
- Water solubility
- Crystalline phase
- Dustiness
- Crystallite size
- Representative TEM picture(s)
- Particle size distribution
- Specific surface area
- Zeta potential (surface charge)
- Surface chemistry
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