

NAN TECHNOLOGY ANSI-NSP STANDARDS PANEL

Break-out group II: Measurement and characterization

Presented by

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Breakout Group II participants

- Ana Morales, Anthony Kotula, Jimmy Radney, John Davis, Kabir R., Katrina Varner, Maddy Goodhart, McKenzie Coughlin, Philippe Hallegot, TJ Cho, Vince Hackley, Eduardo Correa, Kalma Migler
- + others!

Introduction/Charge to Breakout Group II

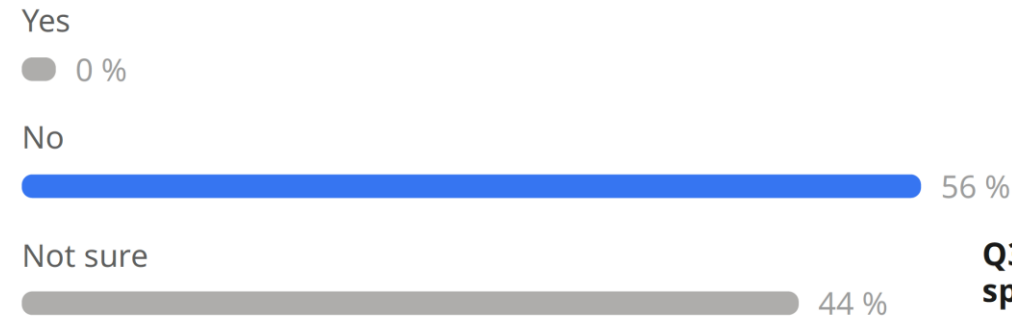
■ To improve the shared understanding on measurement and characterization and identify how SDO's could initiate standards development activities

- THIS IS THE M & C BREAKOUT GROUP. Q1. Can existing standards and technical reports for measuring physical, chemical and performance properties for nanomaterials also be used for nanoplastics?
- Q2. If existing documents cannot be utilized, what makes nanoplastics distinct from the class of nanomaterials?
- Q3. Some metrology standards are aimed at specific materials/classes, do nanoplastics require any standard activities that are unique?
- Q4. What are the principal measurement challenges for nanoplastics?
- Q5. What are the sampling/separation needs/challenges of nanoplastics where having standards would help?
- Q6. What techniques/methods do you currently use in your nanoplastics research?
- Q7. A concern for nanoplastics (as well as for microplastics) is that they may be carriers for toxicants even if they are not toxic themselves. Are there tools to assess nanoplastics are carriers?
- Q8. What tools are currently available for nanoplastics?

Discussion Summary

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Q3. Some metrology standards are aimed at specific materials/classes, do nanoplastics require any standard activities that are unique?

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Discussion Summary

Q2. If existing documents cannot be utilized, what makes nanoplastics distinct from the class of nanomaterials?

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- also, we have the complexity of do we include nano fibers from clothes that are also made of polymers?
- The question does not provide enough information for me to provide a useful answer.
- reproducibility in terms of their formation and composition especially if they are environmental samples
- there is no single type of nanoplastic or source for that matter
- surface area, reactivity, morphology, mechanism of formation
- nanoplastics are comprised of a wide variety of materials of different chemistries, applications, morphology, structure
- not pure material, different phys/chem properties of polymers, are NP truly solid materials?
- Chemical variability, shape and surface area variability

Q5. What are the sampling/separation needs/challenges of nanoplastics where having standards would help?

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For example, something like PE would separate differently than an oxidized counterpart

Standards identifying needed controls in order to understand impact of contaminant particles from sampling or separation equipment

Environmentally-relevant standards (like surface oxidized particles/photooxidized) to understand the properties of ambient NP

- sampling without contamination

- isolating from complex mixtures or matrices
- separating by composition
- separating by size
- Separation by chemical type, identification and isolation of chemically hazardous nanoparticles.
- Any measurement that requires calibration and validation

Top standards priorities relative to nanoplastics measurement and characterization

- Everything is a measurement challenge with nanomaterials
- It may be best to glean best practices for nanomaterials to analyze nanoplastics. We definitely have learned something from working with nanomaterials that is applicable to nanoplastics.
- Measuring incredibly small things, embedded in a background of similar composition
- We transitioned from generic standards to standards designed to address needs of a stakeholder.
 - Generic – good for baseline “how to use TEM, etc” – best practices, procedures, etc for a technique.
 - Stakeholders – good for “detail” studies. Fit-for-purpose
 - Broad-base standards that work until they don’t. Then develop more specific that can.
Biodegradation - may not apply to certain situations.
- We need standards now! 1) Test materials, 2) analytical methods, 3) reporting results consistently (standard units).
- What do you know about the materials you are going to take measurements on? How do you change your measurement protocol appropriately?
- Contamination – on of the biggest issues in sampling and monitoring MP and NP

Top standards priorities relative to nanoplastics measurement and characterization

- Convene the expertise.
- Material Specification for what properties need to be measured from a mixture of incidental nanoplastics from the environment.
 - Mixtures of incidental nanoplastics – Measurement Method for quantitative compositional analysis of a mixture of incidental nanoplastics.
- Method/protocol for sampling a representative mixture of nanoplastics from the environment.
- Measurement method – Quantitation of nanoplastic populations by pyrolysis GCMS
- Reference materials for major plastics – (e.g. polyethylene, polypropylene)
 - Progress from this to standard measurement practices, round robin on analytical methods.

General Comments