



Part 2:

What standards can be developed for Advanced Materials at this time?

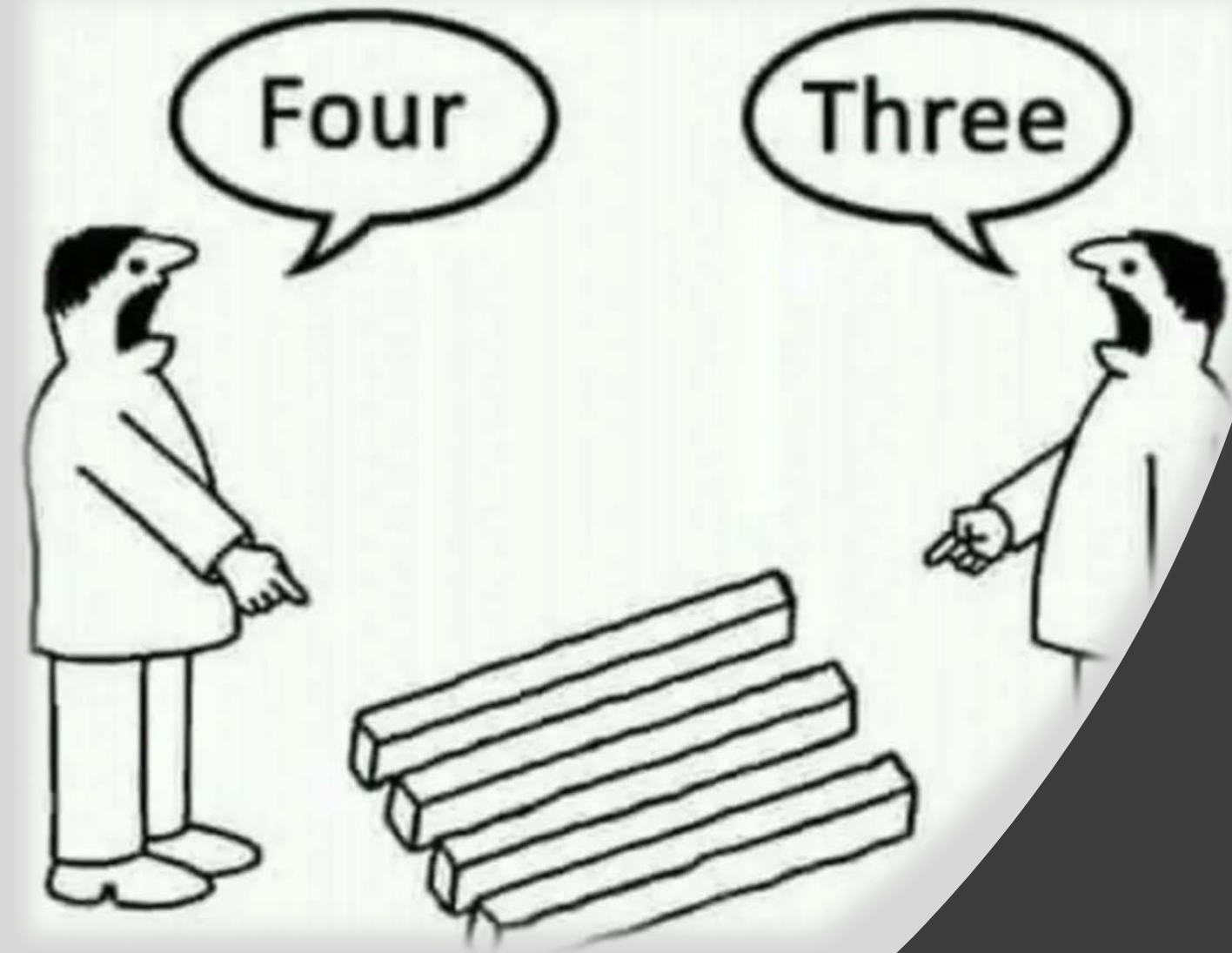


Standards Development for Advanced Materials – Relevant Actions

ANSI Nanotechnology Standards Panel
Advanced Materials Virtual Workshop
May 4, 2022

Scott C. Brown

Perspectives can differ...

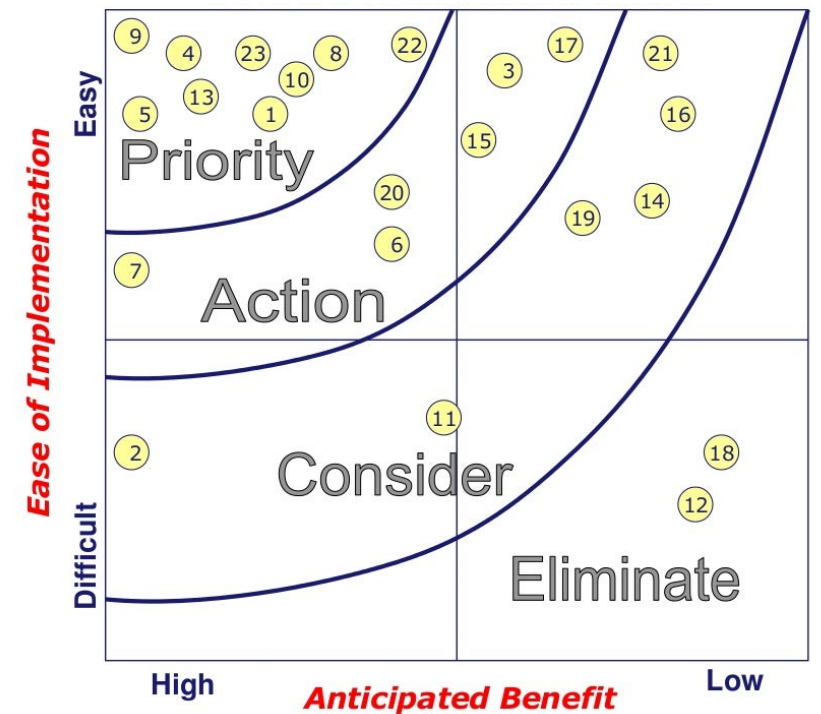
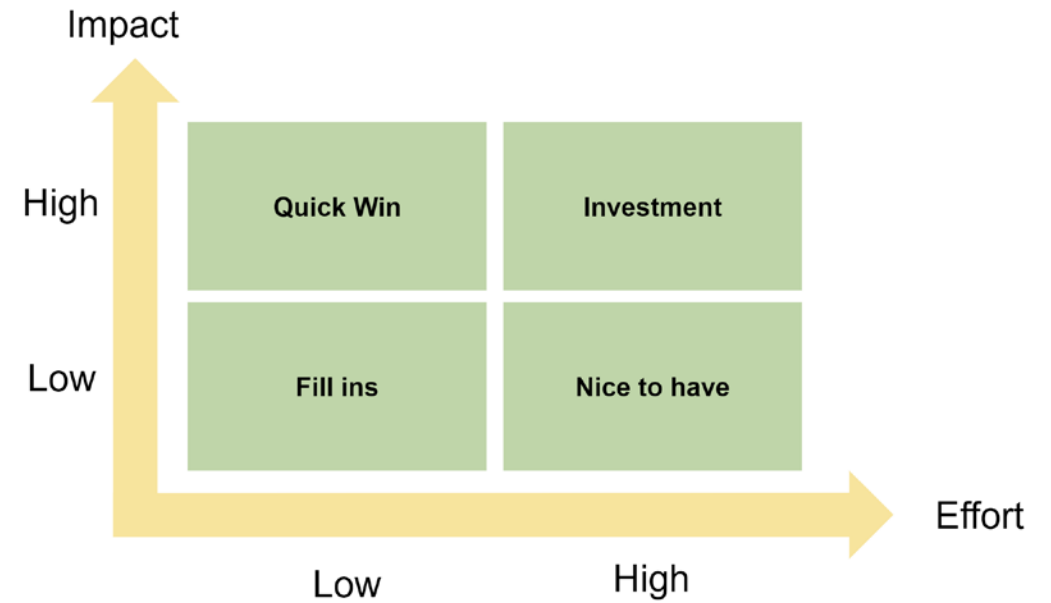


What has, and can be done?

1. Terminology
2. General measurements and characterization (much of this exists)
3. Health, Safety & Environment (much of this exists)
4. Material Specifications (e.g., graphene)
5. Performance Standards
6. Sustainability impact and metrics

What needs to be done?

- Avoid double-work with other SDO's
- Partner with stakeholders & vertical committees
- Identify gaps & prioritize

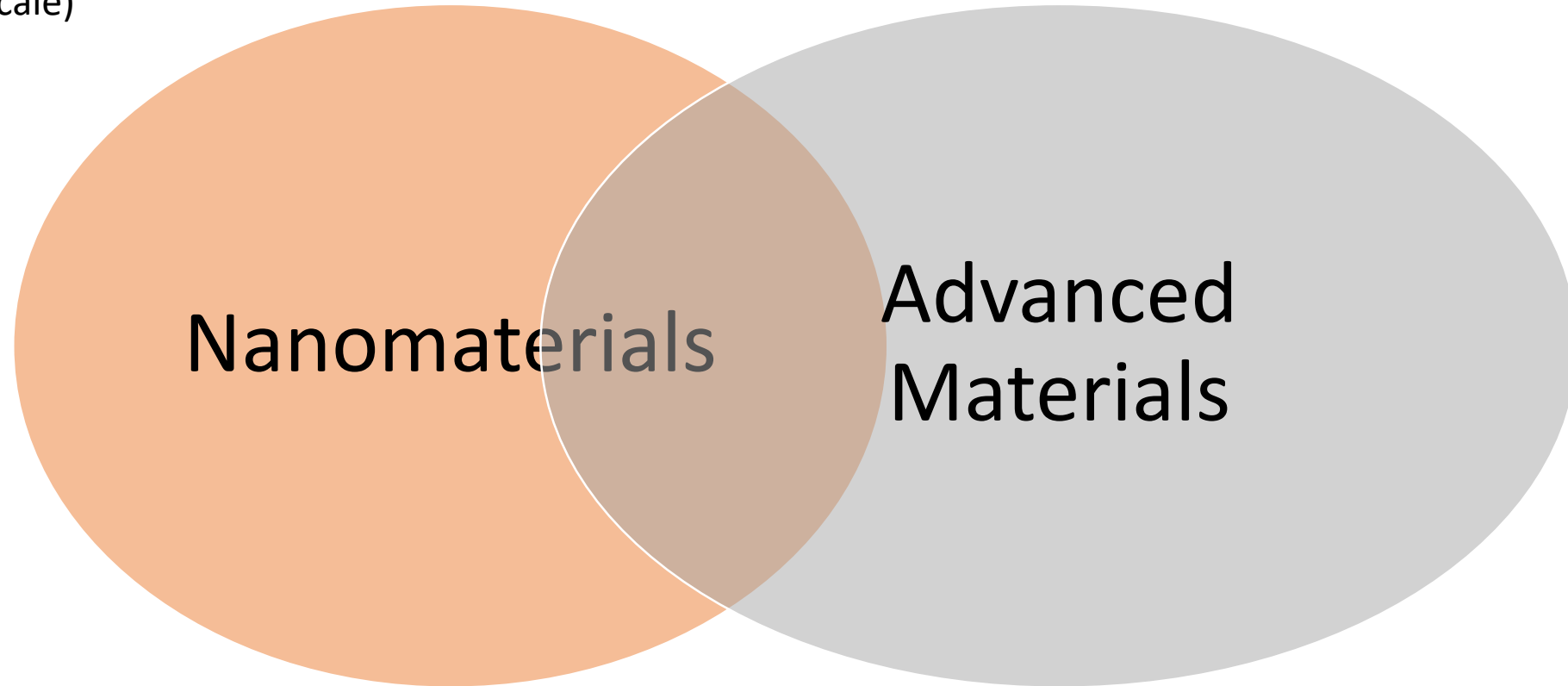


Overlaps & Distinctions

Colloidal Silica
(nanoscale)

Metal Organic
Frameworks

Novel Polymers,
Metal Alloys



Nanomaterials

Advanced
Materials

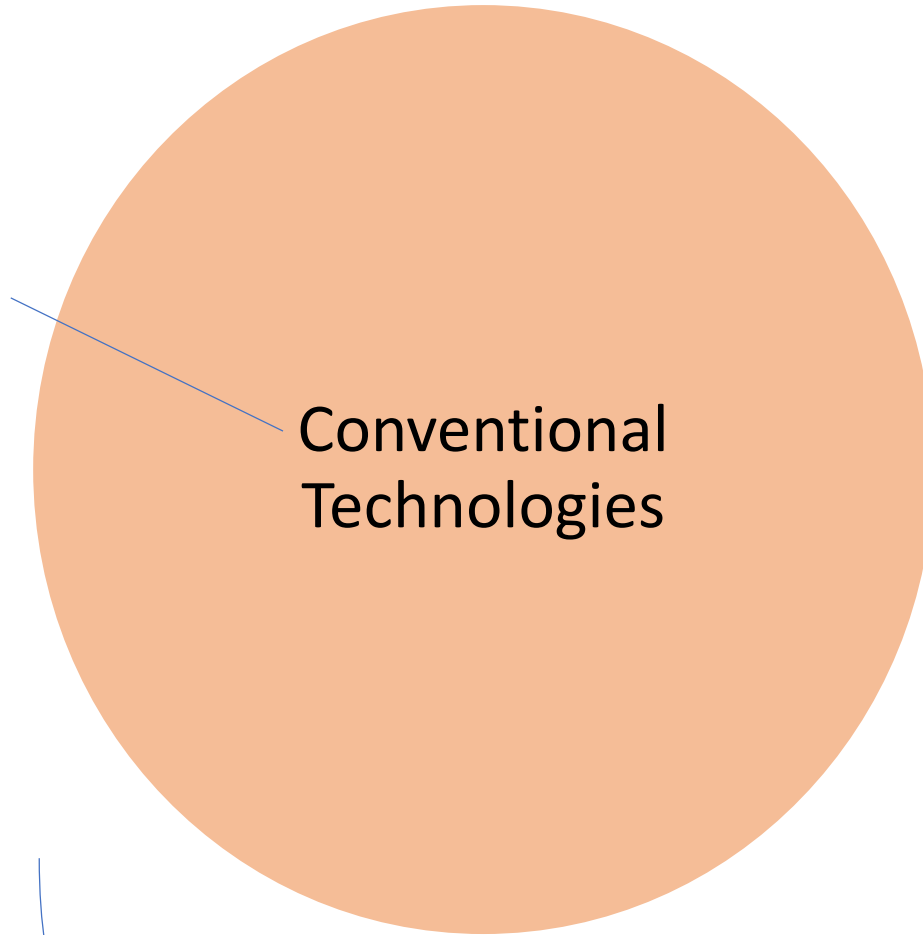
Quick Wins

- Many nanotechnology existing nanotechnology standards are relevant for subsets of advanced materials
- Existing SDOs have historically addressed Advanced Materials implicitly.
 - Communicating and acknowledging relevance may be helpful given increasing interest.
 - Adding any relevant application or technology specific details may be helpful.

(note: perspectives may be different)

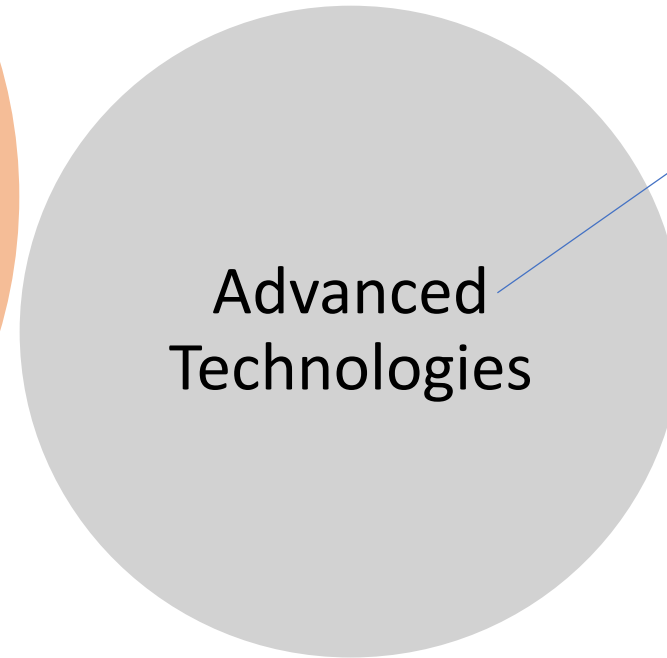
Advanced Materials & Technology

Established
SDOs &
Standards



Conventional
Technologies

Emerging SDOs &
Standards



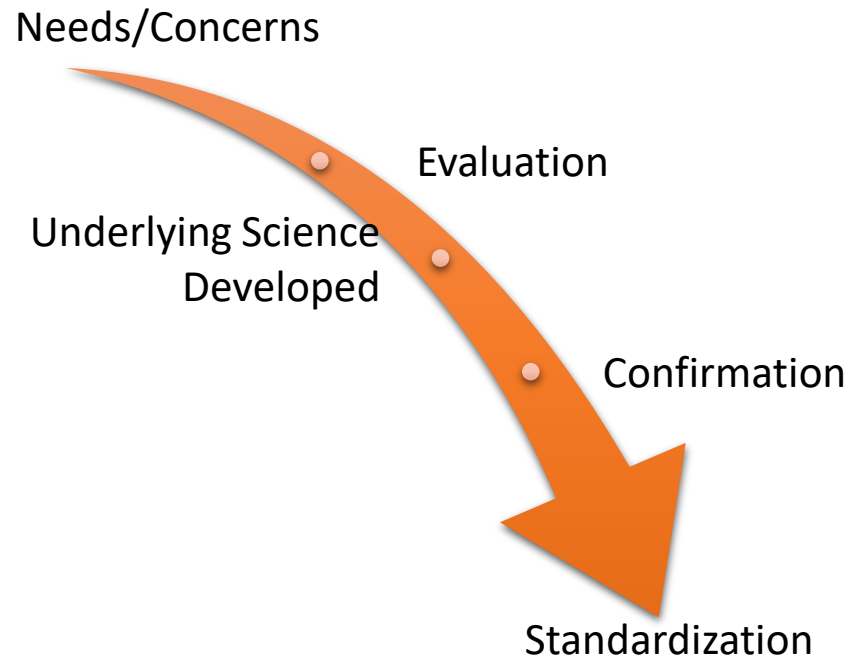
Advanced
Technologies

Advanced Materials can come from both

Investments

- Longer term, high impact
- Return on investment—Depends on accuracy of foresight (e.g., projected versus actual impact)
- What are the longer-term critical needs for advanced materials not met by current standardization activities?

Transparency, Trust, & Conversations



Perspectives

- Most standards will be relevant to advanced materials in addition to conventional or alternative materials.
- Adapting standards for advanced materials may only mean better clarifying failure modes attributed to material characteristics.
- Standards involving advanced materials will require a somewhat greater engagement of stakeholders.
- Technology and application specific elements may be essential. (Depends on need and purpose)

Which EHS Standards can be adapted for Advanced Materials?

(virtually all of them, depending on the advanced material)

ISO/TS 12901-1:2012

Nanotechnologies — Occupational risk management applied to engineered nanomaterials — Part 1: Principles and approaches

ISO/TS 12901-2:2014

Nanotechnologies — Occupational risk management applied to engineered nanomaterials — Part 2: Use of the control banding approach

ISO/TR 13014:2012

Nanotechnologies — Guidance on physico-chemical characterization of engineered nanoscale materials for toxicologic assessment

ISO 29701:2010

Nanotechnologies — Endotoxin test on nanomaterial samples for in vitro systems — Limulus amoebocyte lysate (LAL) test

ISO/TR 22293:2021

Evaluation of methods for assessing the release of nanomaterials from commercial, nanomaterial-containing polymer composites

ISO/TS 22082:2020

Nanotechnologies — Assessment of nanomaterial toxicity using dechorionated zebrafish embryo

ISO/TR 22019:2019

Nanotechnologies — Considerations for performing toxicokinetic studies with nanomaterial

ISO/TS 21633:2021

Label-free impedance technology to assess the toxicity of nanomaterials in vitro

ISO/TR 21624:2020

Nanotechnologies — Considerations for in vitro studies of airborne nano-objects and their aggregates and agglomerates (NOAA)

ISO/TR 21386:2019

Nanotechnologies — Considerations for the measurement of nano-objects and their aggregates and agglomerates (NOAA) in environmental matrices

ISO/TS 20787:2017

Nanotechnologies - Aquatic toxicity assessment of manufactured nanomaterials in saltwater lakes using Artemia sp. Nauplii

ISO/TR 19057:2017

Nanotechnologies — Use and application of acellular in vitro tests and methodologies to assess nanomaterial biodurability

ISO 19007:2018

Nanotechnologies — In vitro MTS assay for measuring the cytotoxic effect of nanoparticles

Concluding Remarks

- Advanced materials are everywhere. They have been and will continue to be standardized across various SDOs.
- Standards explicitly for “advanced materials” are not prominent, and arguably are not needed. Rather standards should be inclusive of advanced materials.
- Quick wins (things that can be done now) is to adapt standards to be inclusive of advanced materials as needed.
- Many standards in ISO/TC 229 are already applicable to subsets of advanced materials. Cautions exist with regards to the robustness of failure mode analysis.

Thank you!

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