

OECD Advanced Materials Thematic Conferences Report

27th Meeting, November 2020

Background:

The overarching aim of the conferences was to improve understanding of the field of advanced materials (AM) and identify approaches for structuring the field, prioritisation of work and ensure appropriate assessment. A strong focus of the meetings was exploration of where regulatory priorities reside and which assessment approaches would best address advanced materials. The conferences were framed within the EU Green Deal, Chemical Strategy for Sustainability and EU Research and Innovation plans. The two events provided examples of AM current, and planned, usage across a range of sectors that will be of interest to Defra including; construction materials, green energy production, agriculture & food and recycling. The first conference held on 16th of June, 2020 was to identify action needed regarding chemical safety of advanced materials with the second online conference, held on the 15th of September and jointly organised with the OECD Working Party on Manufactured Nanomaterials, focussed on examples of advanced material types, their chemical safety and exploration of concerns they may pose, including shortcomings in hazard and exposure assessment approaches and tools.

Key points from the first meeting were:

Identification of 7 groups of advanced materials (advanced polymers, biopolymers, porous materials, particle systems, advanced fibres, composites and metamaterials),

- Recognition that information gaps on hazard, uses and exposures were significantly greater when compared to nanomaterials, and an acknowledgement that AMs were broader than nanomaterials,
- Challenges were discussed regarding assessing risks of AMs, even within a single grouping, due to the diversity of materials and cross over due to the combination of several advanced materials used at once,
- AMs are not a recognised regulatory term and are used by commercial and industry bodies to describe innovation.
- Challenges were identified in relation to harmonisation, for example, between medical products, pharmaceuticals, REACH and food & packaging regulations as currently there is no common understanding of what AMs are and which pose potential risk and regulatory challenges,

Key points from the second meeting were:

- Key consideration is to move from 'safe by design' to 'safe and sustainable by design'
- AMs will play significant role in innovative research used in renewable energy, digitalization, healthcare etc
- Concern that AMs may contain small complex structures making them mixtures. This makes information requirements difficult to obtain and consequently difficult to make a

risk assessment. Possible questions about safety issues depend on material type and may need to be considered on a case-by-case basis,

- AMs cause difficulty to circular economy due to their complexity and diversity of materials. It is difficult to separate products and the wide dispersion of substances makes it difficult to recover substances from waste stream,
- AMs should be developed with the aim of being in the circular economy as long as possible without adverse effect.
- Smart NMs (SNMs) are a group of AMs which change their functional properties during use and activate specific function in response to stimuli. These are used in pharmaceuticals, cosmetics, electronics etc. An example provided stated that 23% of NMs used in agriculture respond to stimuli (temp, pH, light)
- They discussed safer by design and examples from agriculture, cosmetics etc.
- Safer by design is an appropriate tool to improve safety of SNMs at pre-pilot stage
- Terms SNM and AMs are not precisely defined in science for policy context. Harmonization of activities in OECD and other areas would support improved understanding.

An example of the complexity of advanced materials was presented via a research project commissioned by the German Environment Agency (UBA). They looked at 3 poly-dispersed materials: metals and polymers (used in 3D printing), materials of different morphologies (fibres in construction) and mixed chemicals. The researcher showed that polymers degraded into fragments from 10 nm – 10 µm. Polymer itself may not be toxic but the fragments or leaching of additives may be of concern. Pollutants were shown to adsorb and desorb from AMs which may require further review.

Challenges of advanced materials and next steps

- Further scientific and technical exploratory meetings required to identify knowledge gaps and identify ways to address these to better support policy makers,
- Need to 'future proof' advanced materials to fulfil the requirements of the circular economy.
- Proposed screening of AMs that are likely to create eco-toxic risks to waste management and to screen if AMs are suitable for recovery for secondary use,
 - Criteria to screen: separation from the overall waste stream, if AM contain eco-toxic substances that would create contamination to the waste stream, could the structure of the AM be maintained during the recovery process,
 - Acknowledgement that life cycle information is necessary to do this screening and that not all regulatory frameworks require eco-toxicological testing.
 - Exposure data and definitions are a limiting factor,
- EU Green Deal and Chemical Strategy for Sustainability released 14th Oct discussed AMs, as evidence of innovative industry production but with need for converging chemical safety,
- EFSA looking at AM (nano-fibres complexes through oral exposure),
- OECD work on the chemical-waste interface has not addressed NMs/AMs before. Currently there are no plans to investigate these further over next couple of years,
- OECD publication on NMs in waste streams highlight the lack of knowledge on the behaviour of certain NMs and how this affects waste streams.

A third Thematic Conference is planned for 5th/6th May 2021 in Berlin, with the basis of the conference reviewing the learning and outcomes of the previous conferences which will form

a strong foundation with regard to the chemical safety challenges posed by advanced materials and the developing recommendations.

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