Workplace lifecycle exposure and risk from Advanced Materials

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What are advanced materials?

Advanced materials may have different physicochemical properties to existing materials in use today. They are expected to play a prominent part in the future of many industries[1], ranging from automotive, aerospace, the built environment, defence and electronics to medical (**Figure 1**). Some may pose potential risks to health from inhalation of hazardous particulate substances produced during manufacturing, processing and use.

Figure 1. Examples of applications of advanced materials[2,3]

Why is this project important?

In the UK there is a drive towards net-zero (**Figure 2**) where use of these materials could contribute. It is important that the health risks are understood throughout the workplace lifecycle of these materials. Understanding the risks will help their safe development, use and commercialisation and allow HSE to better regulate in this area.

Figure 2. Net zero logo[4]

Objectives

1. Identify what new advanced materials are available and whether there are known potential health risks during their workplace lifecycle.
2. Develop methods to characterise emissions when these materials are processed.
3. Measure workplace emissions and identify effective control measures.

Collaborative approach

Ongoing engagement with stakeholders from HSE and industry (**Figure 3**) will shape this research.

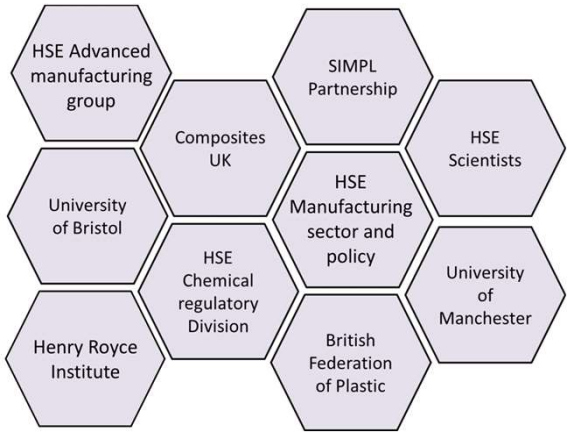

Figure 3. Stakeholders for this research

Approach

Objective 1 will be achieved through a literature review and questionnaire with ongoing engagement with industry, academia and HSE stakeholders.

Objective 2 will be achieved through method development and emission characterisation when processing advanced materials in HSE's dust tunnel (**Figure 4**) and calm air chamber.

Figure 4. HSE's dust tunnel facility

Objective 3 will be achieved through workplace measurements of emissions and consideration of exposure controls in manufacturing facilities (**Figure 5**).

Figure 5. Example of manufacture of a thermoplastic composite turbine blade[5]

Responsible Innovation

- Enabling safe innovation at the right time (**Figure 6**)
- Effective communication with stakeholders
- Ethical risk assessment
- Health, Safety and Environmental risk assessment

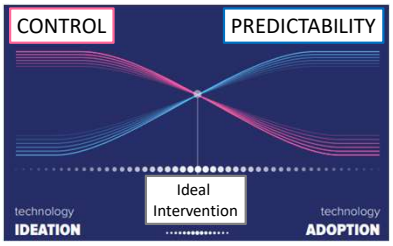

Figure 6. Suggested ideal area of intervention[6]

Challenges

This topic is very broad so this project will focus on specific materials and sectors where appropriate.

Occupational lung disease is often long latency.

Nanoparticle measurements in the workplace are difficult due to high background levels.

References

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