Department of Engineering – Risk Assessment Ref No. B969

Title of project/experiment/activity Use of microfluidic processors	
Location of activity EEDBA Annexe : Chemistry Lab	**Start and end dates** 08/09/2015 - continuous

Brief description (or attach procedure/protocol)

A Microfluidizer is a homogenizer which converts fluid pressure into shear and collision forces that result in uniform particle size reduction or in multiphase mixing. Product enters the system via the inlet reservoir and is powered by a high-pressure pump into the interaction chamber, where high shear is applied, at speeds up to 400 m/s. It is then effectively cooled and collected in the output reservoir.

The equipment is located in Chemistry Lab. It is expected to be used daily for several hours. The weighting and mixing of solutions will be done in the Chemistry Lab. Materials (graphite, polymers and surfactants) are mixed with solvents and processed with microfluidizer to produce stable dispersions.

The M110-P Microfluidizers are commercially made systems for homogenization and will be used in accordance with the manufacturer's instructions.

Due to different sealing materials in the microfluidizer, the only solvents that can be used are water, isopropanol, butanol (not ethanol or methanol), glycols, silicone oils.

Hazard	Effect	Control measures	Residual risk
General hazards in lab	Inhalation of solvents Exposure to chemicals harmful to health	The dispersion solvents may be irritating to the eyes, respiratory system and skin. Gloves and goggles are worn to prevent skin and eye damage. The initial dispersion are prepared at a solvent wet bench. When using hazardous solvents during operation an extractor should be used and/or the inlet and outlet reservoirs sealed with a cover in place to prevent solvent vapours entering the open lab area. The use of various chemicals will be covered in separated risks assessments dealing with the preparation of nanomaterials inks and COSSH forms. Other lab users will be using solvents with appropriate extraction in place (Likelihood: 1, Severity: 1) Gloves, eye protection and lab coat must be worn whilst in the laboratory. The Chemistry Lab rules will be respected.	Low risk
Electric shock	Shock to user, damage to equipment	Do not get outer parts of microfluidizer wet. Clean up any spillages immediately. (Likelihood: 1, Severity: 1)	Low risk

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Personal Protective Equipment required [*eye/face protection, respiratory protection, gloves, lab coat etc*]

Lab coat, gloves (purple nitrile) and eye protection (safety specs) required in the lab at all times

Emergency Instructions & First Aid

Spillage:
Solvent spillage or water-based dispersion spillages can be dealt by wiping with wipes. The wipes disposed into waste bins or should be left to dry (in the case of solvent spillage) in the solvent fume cupboard prior to disposal into waste bins.

Fire:
In case of fire, the fire alarm should be sounded and fire service called. If safe to do so, the fire may be extinguished using an extinguisher containing carbon dioxide, located in the corridor outside the laboratory.

First aid:
General advice: Consult a physician. Show this safety data sheet to the doctor in attendance.
If inhaled: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact: Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.
In case of eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

Any special monitoring required [*e.g. hearing test, vibration monitoring, health surveillance*]

No

Further control measures required? If yes, list with actions.

Waste Disposal Procedures: Aqueous waste should be disposed in a container separate from solvent waste. Other solvents (IPA, butanol, glycols) will be disposed of in suitable non-chlorinated waste containers.

In the case of equipment malfunction/failure: shutdown instrument and chiller from power buttons or directly from plug socket.

Biological/Laser/Radiation Approval [*requires relevant Specialist Safety Officer signature and date*]
N/A

Out of hours/Lone working
Microfluidizers can only be used during working hours.

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Signature to confirm that this is a suitable and sufficient assessment of risk and that stated control measures are in place. This risk assessment should be reviewed if additional risks not covered in this assessment are identified or if there is any reason to indicate that the control measures are insufficient.

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Local Safety Coordinator	**Signature** David Harbo	**Date** 13/4/17
Departmental Safety Office IAN SLACK	**Signature**	**Date** 24 APR 2017