Department of Engineering – Risk Assessment Ref No. B878

Title of project/experiment/activity

Use of Langmuir-Blodgett machine to make membranes

Location of activity	**Start and end dates**
Cambridge Graphene Centre : ink Lab	2015/11-continuous

Brief description (or attach procedure/protocol)

A Langmuir–Blodgett trough is used to compress monolayers of nanomaterials or molecules on the surface of a given subphase (usually water) and measures surface phenomena due to this compression. It can also be used to deposit single or multiple monolayers of nanometerial or molecules on a solid substrate by pulling the substrate out of liquid at a controlled speed.

The formation of the monolayer on the liquid subphase is done *in situ*.

The Langmuir-Blodgett system is a commercially made system and will be used in accordance with the manufacturer's instructions.

Hazard	**Effect**	**Control measures**	**Residual risk**
Exposure to chemicals: Solvents, surfactants.	Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).	Lab coat, gloves, eye protection and mask required during experiment	Low risk
Electrical shock	AC voltage may constitute electric shock hazard.	Examine the machine before experiment. If find any breakage or exposure of connecting wires, Do not operate the machine till problems being fixed	Low risk

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

Gloves, Mask, Glasses.

Emergency Instructions & First Aid

Spillage:
Spillage can be handled using a standard spill kit available in the ink lab.

Fire:
When using ethanol, Isopropyl alcohol and other common solvents that could be flammable. 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.

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. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. 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.

No

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

N/A

Out of hours/Lone working

Out of hours/lone working permitted if authorised by Supervisor. Require permission from Head of Division.

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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.

Name of Assessor Panagiotis Karagiannidis Email: pk412@cam.ac.uk	**Signature**	**Date** 31/8/2016
Name of Supervisor Prof A.C. Ferrari Email: acf26@cam.ac.uk	**Signature**	**Date** 2/9/16

Local Safety Coordinator	**Signature** David Hucks	**Date** 2/11/16
Departmental Safety Office IAN SLACK	**Signature**	**Date** 9 NOV 2016