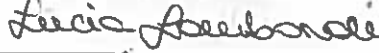



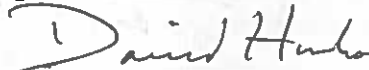

Title of project/experiment/activity Use of tip sonication			
Location of activity Cambridge Graphene Centre : Chemistry Lab		Start and end dates 24/08/2015 - continuous	
Brief description (or attach procedure/protocol) <p>In a tip sonicator, a high frequency electrical energy is converted into ultrasound waves by means of ultrasonic transducers, which are bonded in the horn. The cavitation which is caused by the drop of local pressure generates turbulent flow and high shear leading to particle size reduction, debundling or exfoliation. Tip sonicator is in Cambridge Graphene Centre Chemistry Lab and is used to exfoliate layered nanomaterials from bulk materials and to debundle CNTs.</p> <p>Only water based solution can be prepared properly placing the dedicated tube in the sonicator. Dedicated tubes can be filled with maximum 20 ml of solution.</p> <p>The temperature of the tip sonicator is maintained by dipping the horn in a baker containing water and ice cubes. Ice must be added every 1 hour.</p> <p>The tip sonicators are a commercially made systems for homogenization and will be used in accordance with the manufacturer's instructions.</p>			
Hazard	Effect	Control measures	Residual risk
General hazards in lab	Inhalation of solvents Exposure to chemicals harmful to health	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
Ultrasound (kHz)	Exposure to noise Ultrasonic wave shock	Avoid contact with the machine during operation closing the lid. Switch off sonic function key before placing/removing samples. (Likelihood: 1, Severity: 1)	Low risk
Electric shock	Shock to user, damage to equipment	Do not get outer parts of the sonicator wet. Always fill and empty the container to maintain the temperature. Hold tube firmly in during the installation inside the sonicator. (Likelihood: 1, Severity: 1)	Low risk

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

<p>Lab coat, gloves (purple nitrile) and eye protection (safety specs) required in the lab at all times</p>
<p>Emergency Instructions & First Aid</p> <p>Spillage: Water-based dispersion spillage should not be more than 60 mL, and can be dealt by wiping with cleanroom wipes. The wipes disposed into waste bins.</p> <p>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.</p> <p>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.</p>
<p>Any special monitoring required [e.g. hearing test, vibration monitoring, health surveillance]</p> <p>No</p>
<p>Further control measures required? If yes, list with actions.</p> <p>Waste Disposal Procedures: Aqueous waste should be disposed in a dedicated container separate from solvent waste.</p> <p>Dedicated tubes must be cleaned in the solvent-fume cupboard sink.</p> <p>In the case of equipment malfunction/failure: shutdown instrument and chiller from power buttons or directly from plug socket.</p>
<p>Biological/Laser/Radiation Approval [requires relevant Specialist Safety Officer signature and date]</p> <p>N/A</p>
<p>Out of hours/Lone working</p> <p>The system can be used overnight.</p> <p><i>Requires HoD permission</i></p>

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 Dr. Lucia Lombardi Email: ll455@cam.ac.uk	Signature 	Date 08/08/2016
Name of Supervisor Prof A.C. Ferrari Email: acf26@cam.ac.uk	Signature 	Date 21/8/16

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