



GENERAL FLAKE PREPARATION

Overview

The main activities of the NGI are focused around this area. We provide the capability firstly to clean substrate/sacrificial wafers with our solvent wetdecks and fumehoods, complete with sonic baths and waste disposal drip-cups connected to a semi-automated carboy system.

Next we have the facilities to allow users to spincoat and bake a variety of polymer layers onto their substrates for the purposes of flake preparation/transfer or lithography (optical or e-beam). The suite of Nikon microscopes allows the location and identification of flakes.

Finally, our bespoke flake transfer rigs can be used to position and transfer 2D flakes onto substrates or onto other flakes to allow the building of 2D heterostructures.

Capability profile

Our suite of Nikon microscopes provides 2D flake searching capabilities. We have 5x, 10x, 20x, 50x and 100x lenses fitted to all microscopes and a set of 8 narrow bandpass filters running from 480nm-620nm associated with each microscope.

We also have the accessories to perform 50x & 100x dark-field imaging, polarisation microscopy and differential interference contrast (DIC) microscopy fitted to many of our microscopes. All microscopes have high resolution cameras attached to allow the capture of flake/device images. We also have the capability to perform some basic photoluminescence measurements on one of the microscopes.

The sonic baths have variable power and heat settings and can be run in timed or constant mode with several different options for pulsing the sonic vibrations. The spin coaters are fully programmable with storage space for 1,000 user defined recipes. All wetbenches and fumehoods are equipped with solvent waste drip-cups, dry nitrogen guns and ultra-pure deionised water guns and taps.

GENERAL FLAKE PREPARATION

The flake transfer rig provides movement in x, y and z for the transfer arm, as well as movement in x and y, and rotation for the substrate holder; the flake transfer rig can also heat the substrate holder. All samples are held in place by vacuum during the transfer process.

Microscopes:

Lenses	5x, 10x, 20x, 50x, 100x
Bandpass filters [nm]	480, 500, 520, 540, 560, 580, 600, 620
Dark-field lenses	50x, 100x
Polarisers	1 fixed linear, 1 adjustable linear
Differential interference contrast mode	
Colour-sensitive differential interference contrast mode	
Illumination modes	reflection, transmission
Hi-resolution cameras	

Sonic baths:

Power setting	10–100%
Operation modes	0kHz, 35kHz, 130kHz; normal, sweep, Degas
Heating temperatures	room temperature –80°C
Timer	0–15 minutes, ∞

Spin coaters:

Maximum substrate size	6", 8"
Range of speed	0–12000rpm
Range of acceleration	0–51270rpm/s
Dual rotation direction	
User defined recipes	1000

GENERAL FLAKE PREPARATION

Hotplates:

Temperature range	20–50°C, 1°C increments
Stirrer speed range	200–1300rpm

Flake transfer rigs:

Range of transfer arm movement (x, y)	12mm
Range of transfer arm movement (z)	4mm
Range of stage movement (rotation)	290°
Range of stage movement (x, y)	12mm
Stage heater temperature range	room temperature–120°C