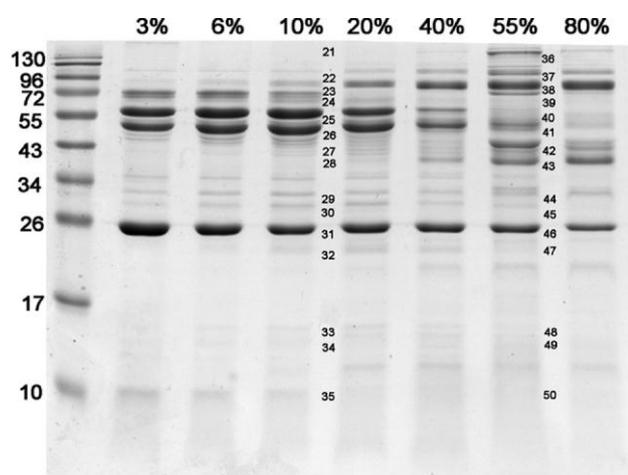


<p><b>Equipment Name: Mass Spectrometry / gel electrophoresis</b></p>	<p><b>Category:</b> C. Particle Characterisation in and ex-situ</p> <p><b>Institute:</b> University College Dublin</p> <p><b>Location:</b> Conway Institute University College Dublin Belfield, Dublin4, Ireland</p> <p><b>Contact Details of Technology Expert:</b> <b>Name:</b> Dr. Giuliano Elia <b>Phone:</b> +3531716 6986/6714 <b>Fax:</b> <b>E-mail:</b> giuliano.elia@ucd.ie</p>
<p><b>Short technology description/Overview:</b></p> <p>The UCD Mass Spectrometry Resource is based in the Conway Institute and is a core facility for researchers as well as offering services to external users.</p> <p>Primary uses of mass spectrometry lie in resolving, identifying and quantify proteins and their post translation modification status after extraction from the biological sample.</p> <p>This facility was the first to develop protocols for how to apply mass spectrometry to the assessment of nanoparticle-protein interactions, and the so-called nanoparticle protein corona.</p> <p>Thus, mass spectrometry can be used to identify and quantify the protein species adsorbed onto different nanoparticle surfaces (protein corona) from different biological fluids (human serum, lung fluid lavage, fetal bovine serum, etc.).</p> <p>Generally protocols need to be optimised for different nanoparticles (as a result of differences in density, surface composition, binding/adhesion strengths etc.), and UCD can support in the development and optimisation of such protocols. Efforts towards recovering nanoparticles from cells and tissues are well underway, and support can be given in this task also.</p>	
<p><b>Main Features (Equipment Capabilities):</b></p> <p><b>Instrumentation:</b></p> <ul style="list-style-type: none"> <li>• The 4800 MALDI-ToF / ToF mass spectrometer with autoloader for high throughput MALDI-MS / MS is applied to gel-based and off-line liquid chromatography (LC) MS/ MS workflows.</li> <li>• the linear ion trap electrospray mass spectrometers, the linear ion trap equipped with Electron Transfer Dissociation source, the Orbitrap, the quadrupole time-of-flight, the hybrid linear ion trap-triple quadrupole cover all possible needs in liquid-chromatography-tandem mass spectrometry.</li> <li>• The technological offering of the Mass Spectrometry Resource is completed by robotic stations for gel spot picking and in-gel tryptic digestions.</li> </ul>	

### Protein Separations Laboratory

- 1-D gel electrophoresis and 2-D gel electrophoresis (2-DE).
- Image scanners including a three colour laser fluorescence scanner (Typhoon) for three colour difference in gel electrophoresis (DIGE) 2-DE.
- LC-based workflows are supported by the multi-dimensional LC system and a nano-LC system and are coupled to a MALDI target loading robot to support off-line LC MALDI-MS.

### Typical Samples & Images:



Mw	Protein Identity	s.c. [10%]	s.c. [55%]
500 kDa	Apolipoprotein-B	282	145
120kDa	Thrombospondin	1	57
90 kDa	Plasminogen	46	94
90 kDa	Transferrin	1	15
90 kDa	Gelsolin	0	18
72 kDa	Fibrinogen alpha chain	651	112
60/72 kDa	Histidine-rich glycoprotein	212	400
72 kDa	Serum Albumin	76	222
72 kDa	Kininogen-I	65	51
60 kDa	Fibrinogen beta chain	841	112
50 kDa	Fibrinogen gamma chain	539	104
50 kDa	Coagulation factor XII	42	90
30 kDa	Apolipoprotein E	55	37
30 kDa	Complement C1q subunit C	30	3
26 kDa	Apolipoprotein A-I	144	123

(Monopoli, Walczyk et al. 2011)

### Key publications:

- Monopoli MP, Walczyk D, Campbell A, Elia G, Lynch I, Bombelli FB, Dawson KA. Physical-chemical aspects of protein corona: relevance to in vitro and in vivo biological impacts of nanoparticles. J Am Chem Soc. 2011 Mar 2;133(8):2525-34.
- Hellstrand E, Lynch I, Andersson A, Drakenberg T, Dahlbäck B, Dawson KA, Linse S, Cedervall T. Complete high-density lipoproteins in nanoparticle corona. EBS J. 2009 Jun;276(12):3372-81
- Lesniak A, Campbell A, Monopoli MP, Lynch I, Salvati A, Dawson KA. Serum heat inactivation affects protein corona composition and nanoparticle uptake. Biomaterials. 2010 Dec;31(36):9511-8.

### Any further Information:

This instrumentation can be used in conjunction with the DCS installation to characterise the protein corona species following the analysis of the nanoparticle dispersion *in situ* in the biological fluid.