



## Extending the scope of your research with protein production solutions

The aim of Protein Production and Characterisation is to assist researchers from all backgrounds with the expression, purification, and analysis of their proteins of interest. Additionally, we can produce proteins to be used as research tools in your lab. We work with three different expression hosts (bacterial, insect, and mammalian cells), and use highly specialised protein purification and characterisation equipment.

### General workflow



### Equipment and expertise

#### Protein expression

- We have several different expression strategies that we can tailor to suit each and every protein, dependent upon what the researcher requires.
- The selection of expression host is crucial, and this table helps make an initial decision:

	Worst	Best
Speed	Insect	Mammalian
Cost	Mammalian	Bacterial
PTMs	Bacterial	Mammalian
Folding	Bacterial	Mammalian

- We have specialised equipment to optimise expression and lysis conditions for your proteins.



Cell culture cabinet for sterile work with mammalian and insect cells, and microscope



Sonicator (left) and French press (right), for cell lysis by ultrasound and high pressure, respectively



Shaking incubators for bacterial, insect or mammalian cells culture



Centrifuges for a variety of uses including cell extract clarification

## Protein purification

- We can employ a variety of initial purification techniques, including affinity or charge based methods. These include:
  - Ni-NTA, for polyhistidine tag.
  - Glutathione Sepharose, for GST tag.
  - Anti-FLAG affinity gel, for FLAG tag, especially used when doing expression in mammalian cells.
- We also normally recommend a second purification step by FPLC. We have several automated GE ÄKTA systems that we can use with different columns:
  - Size exclusion, for separation by size.
  - Ion exchange, for separation by charge.
  - Different types of affinity chromatography.



*ÄKTA Pure with a size exclusion column and two different affinity columns*

- We also have expertise in using ultracentrifugation and different types of chemical fractionation.

## Protein handling and quality control

- Following purification, dialysis and/or further concentration steps can be applied to achieve the correct sample preparation for the downstream technique of choice.

- We also apply different methods for quality control to ensure purity, folding and monodispersity of the sample is achieved. These include SDS-PAGE, UV-vis spectrophotometry, chromatography profiling, SEC-MALLS, and NMR.

## Protein characterisation

- Sydney Analytical has the latest equipment to facilitate the biochemical and biophysical characterisation of proteins and to better understand their function. This, in conjunction with our X-ray crystallography and NMR facilities, enables a complete structural, thermodynamic and functional characterisation of proteins.



*Circular dichroism, to explore structure and stability*



*Microscale thermophoresis (MST, top) and isothermal titration calorimetry (ITC, bottom) systems to study biomolecular interactions*

### For more information

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