

# New solutions in micro-scale proteomics research



## ChIP

Bringing Chemistry to the Protein



### ChIP technology

- Supports micro-scale on-membrane digestion of protein using pico to nanoliter volumes of reagents delivered to PVDF electroblots from 2-D gels
- Piezoelectric 'drop-on-demand' ink-jet technology enables precise and reproducible delivery of reagents
- Critical samples can be archived
- Direct analysis by Shimadzu Biotech AXIMA MALDI TOF analysis for high confidence protein identification
- Multiple chemistry support for higher protein coverage

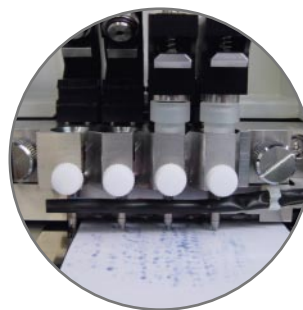
### Key technology areas

- **Post-translational modifications.** Particularly for glycosylation, this technology coupled with LC-ESI MS, can be applied to the structural analyses of oligosaccharides released from a solid-phase membrane.
- **Increased sequence coverage of a protein.** Analysing a single protein spot using multiple endoproteinases.
- **Clinical proteomics.** Conserving critical biological samples.

The ChIP (Chemical Inkjet Printer) is a revolutionary new approach to Peptide Mass Fingerprinting and Protein Macroarray Analysis, developed in conjunction with leading proteomics company, Proteome Systems.

The strategy compliments established protocols in resolving proteins by 2-D gels (using the protein's isoelectric point and apparent molecular weight). However, unlike classical approaches the ChIP reproducibly dispenses picoliter volumes of reagents to defined locations opening new horizons for micro-scale protein research.

For the first time, micro-scale on-membrane digestion can be rapidly generated without the need for time consuming procedures of in-gel digestion, peptide extraction and C18 ZipTip® clean-up steps.



Piezoelectric solvent delivery systems deliver picoliter volumes of reagents to defined locations on the PVDF membrane (supports four different chemistries for multiple enzyme digests on the same spot.)

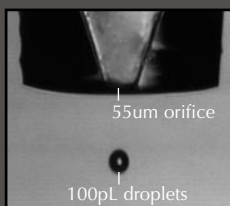
# ChIP Bringing Chemistry to the Protein

Chemical Inkjet Printer technology is a unique technology platform for micro-scale on-membrane protein digestion and automated peptide mass fingerprinting (pmf).

## Key features of the ChIP

- **Precisely delivers picoliter volumes of reagents for micro-scale on-membrane protein digestion.**

Each reagent droplet is ~100pL and can be accurately and reproducibly delivered to a protein target. Printing is a non-contact process ensuring the fluid source is not contaminated by substrate during a printing event.



- **Supports critical sample archiving**

In areas of research constrained by sample availability, for example in clinical proteomics, critical samples can be further characterized using multiple chemistries. The option to specifically select individual proteins for sub-analysis is a considerable advantage in increasing sequence coverage using multiple endoproteinases.

- **High sensitivity detection**

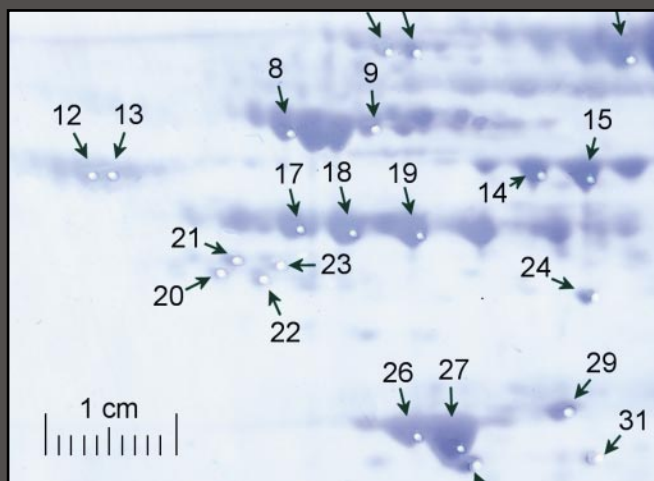
The sensitivity of on-membrane digestion using the chemical printer resulted in the successful pmf identification of femtomole levels of BSA immobilised on an Immobilon-PSQ PVDF membrane (Gooley et al; Molecular and Cellular Proteomics 1; 490-499, 2002). This level of sensitivity is equal to, if not higher than other reported in-gel digestion procedures.

- **Fast, simple and effective**

No need for in-gel digestion, peptide extraction and C18 ZipTip® clean-up steps.

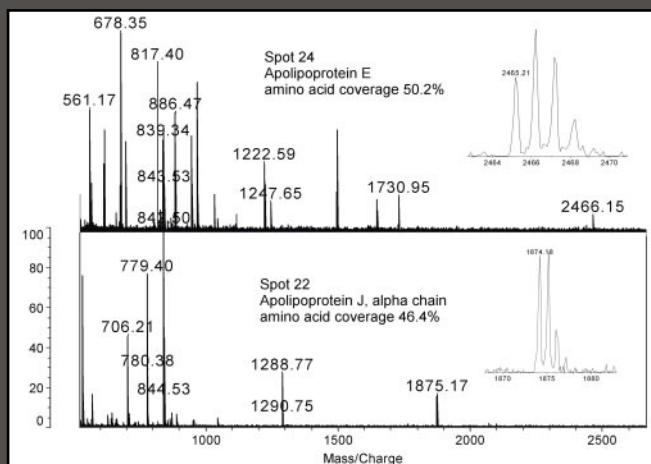
- **New horizons for proteomic research**

Unlike currently practiced Western blotting protocols that routinely require 3 or more hours per analysis, rapid dispensing of multiple antibodies can be used to screen for antigens in several minutes. Using chemical printing, Western blotting becomes a rapid and quantitative user independent technology.



## Chemical inkjet printing on plasma membranes

- *In situ* endoproteinase digests of PVDF bound proteins
- *In situ* endoglycosidase digests of PVDF bound glycoproteins
- Multiple endoproteinase digests possible on single protein spots



## MALDI MS of tryptic peptides derived from spot 22 and 24

- MALDI MS and PSD analysis performed directly on blot
- Seamless integration between ChIP and Shimadzu Biotech's AXIMA family of MALDI TOF instruments
- Automated MALDI MS analysis



\* Developed in partnership with Proteome Systems Ltd. Sydney Australia

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