MagSi Beads & Solutions
for Proteomics Applications
**MagSi Products**

- Magnetic Silica Beads
  - 150nm – 5µm
  - 10 mg/ml

**Magnetic**

**MagSi-Tools**
- Plain silica or activated by COOH, NH2, SH, CHO, SO3, Tosyl etc.

**MagSi-STA**
- Attached Streptavidin or Streptavidin Spacer

**MagSi-A/G**
- Attached Protein A, Protein G

**MagSi-DNA**
- Plain silica + Non-chaotropic reagent

**MagSi-proteomics**
- Plain silica + Attached C4, C8, C18

**MagSi-WCX**
- Plain silica + Weak cation exchange

**MagSi-WAX**
- Plain silica + Weak anion exchange

**MagSi-Giant Q-Dots**
- Plain silica + QDs 300-4000nm

**Applications**

- Protein purification / immobilization, solid assay phase
- Cell Isolation, protein purification, immunoassays, bacteria capturing
- Antibody purification, immunoprecipitations from small sample volume
- DNA/RNA separation, purification after PCR
- Proteomics Application & Processes
- Alternative to MagSi proteomics, Biomarker ID, protein separation
- Biomarker ID and Validation, protein and peptide separation
- Development of a viable assay platform useful in long term bioexperiments without organic labels and the inevitable bleaching effect
Examples of beads used in protein isolation and proteomics

- MagSi-protein G bead type performance and competition
- MagSi-proteomics performance and competition
- MagSi-WCX and MagSi-WAX
- MagSi-S plain silica bead stability
Capacity of MagSi-protein G beads

- GAPDH was used as model
- GAPDH was bound and eluted, analyzed by SDS PAGE

Results show:
- Lane 1: MagSi-protein G 600
- Lane 2: MagSi-protein G 1.0
- Lane 4: Comp. Dynal protein G
MagSi proteomics C18 beads **Manual Handling** testing results

- **4 – 8 fold higher sensitivity** analyzing the BSA digest compared to Microcolumn and ZipTip desalting (right hand side a.u.)
- Significantly **more peptides** could be annotated/identified (numbered peaks)
- **Best signal to noise ratio**
- Enhancement of magnetic capture can add **additional performance** (use 1 µm to 2 µm beads).
MagSi-proteomics beads for bodyfluidics testing – here serum as sample

MagSi-proteomics C18 (reflectron mode)

MagSi-proteomics C8 (reflectron mode)

Dynabeads-RPC18 (reflectron mode)

MagSi-proteomics C8 washing with 200 mM NaCl (reflectron mode) – here FPA

Dynabeads RPC 18 (serum, linear mode)
Serum sample – the various MagSi beads are addressing the various targets

MagSi-WCX acidic elution

MagSi-WCX basic elution

MagSi-proteomics C8

Dynabeads RPC18
MagSi proteomics C18 beads **Automated Handling** testing results

- **Equipment**: Mikrotiterplate (MTP) format for use in automated (robotic) systems (Tecan)
- 24 peptide hits using MagSi beads (vs 8 and 20 hits using competitors beads).
- Complex saliva sample
- Therefore optimized organic solvents were used for MTP use.
Guideline: Choose the right beads for the right application

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<tr>
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<th>MagSi-proteomics C4</th>
<th>MagSi-proteomics C8</th>
<th>MagSi-proteomics C18</th>
<th>MagSi-WCX</th>
<th>MagSi-WAX</th>
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Alternative applications:
- MagSi-WAX/WCX: suitable in phosphoproteomics as prefractionation/depletion tool
- MagSi-proteomics C4, C8 and C18: concentration of diluted samples, e.g. Secreted proteins/peptides into media
- MagSi-protein A/G: capture/enrichment/release of phosphorylated protein/peptides
<table>
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<th>MagSi-proteomics beads</th>
<th>Zip Tips</th>
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<td>Product types available</td>
<td>C4, C8, C18, WCX, WAX</td>
<td>C4, C18, SCX</td>
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<td>&gt;10 µg/isolation</td>
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<td>Sample volume scalability</td>
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<td>no</td>
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<tr>
<td>Robotic work flow usage</td>
<td>yes, no back-pressure</td>
<td>limited, back-pressure</td>
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<tr>
<td>Price comparison of product</td>
<td>2 x less expensive as</td>
<td>ZipTips®</td>
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### Diagram:

1. **Wash Beads**
   - Add beads to sample
   - Collect beads and remove supernatant
   - Wash beads
   - Resuspend in Desorption buffer
   - Collect desalted and fractionated peptides
   - Impurities/salt
   - Peptides/proteins

2. **Volume Concentration**
   - Low Low
   - Low High
   - High Low
   - High High
Replacing HPLC fractionation with MagSi-proteomics beads

**Old established approach:**

- Single experiment: 2.5 – 3 hr
- Serial approach – one run after another
- Not suitable for emergency diagnostics

**New approach**

- Single experiment apr. 30 – 40 min.
- Massive parallel approach possible
- Hundreds of samples can be processed in parallel

Serum sample

HPLC fractionation

Mass spec readout (here Q-TOF micro)

MagSi-proteomics isolation and fractionation

Serum sample
Stability of MagSi beads

- MagSi-S beads have been tested under high salt conditions, high temperature and both.
- MagSi-S beads are stable for pH values between 3 and 13.
- MagSi-S beads are stable for temperatures up to 95°C.
- MagSi-S beads are stable in high salt conditions up to 4M NaCl.
High flexibility:
- Time:
  < 2 month develop.
  fast production
- Customized
  Properties e.g.:
  - Sizes
  - Magnetic content
  - Solid - Fluid
  - Colours
  - Luminescence
  - Biocompatible
  - Hydrophilic
  - Hydrophobic
  - Thermo sensitive
  - Thermo stable

Sizes
- 5nm -> 100nm particles
- 300nm – 50µm beads

Matrix Selection:
- Polymers
- Gelatine
- Silica

Encapsulation of:
- Magnetic colloids
- Drugs
- Luminescents
- Biologicals

Surface Functionalities:
- e.g. COOH, OH, DEAE, QEA, SO3, PEG
- Binding of various bio reactive molecules
MagSicustom product development potential

Magnetic Force
Variable amounts of ferro fluid and variable magnetic force (up to 50 emu/g)

Core

Surface

Your Application

Bead Size
150 nm <-> 1,5 μm

Bead Sedimentation
Customization Potential for Particles & Beads…when standard doesn't fit

Speed and versatility of the manufacturing process enable us to offer beside ready to use products tailor-made particles with a wide range of features and short term development cycles.