

# High-Performance Magnetic Nanoparticles

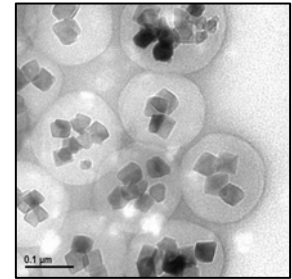
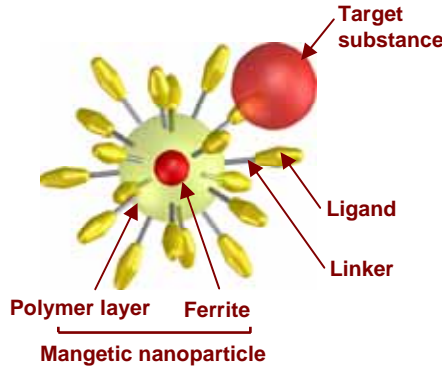
for rapid and easy fishing up of target proteins / chemical substances

Developed by Dr. Handa at Tokyo Institute of Technology, Japan

## Magnetic nanoparticles (FG beads) <sup>1)</sup>

The magnetic nanoparticle developed by Tokyo Institute of Technology consists of ferrite nanoparticles coated firmly with a polymer layer and its diameter is approx. 200 nm.

The magnetic nanoparticles (FG beads) are used as matrices for affinity purification of target substances.



TEM image

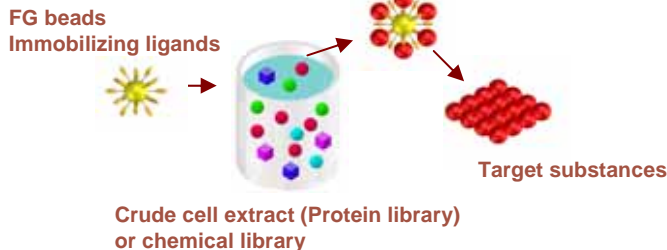
## Features

### High recovery

Target substances can be efficiently bound because FG beads have a large surface area and high dispersibility in solutions.

### High purity

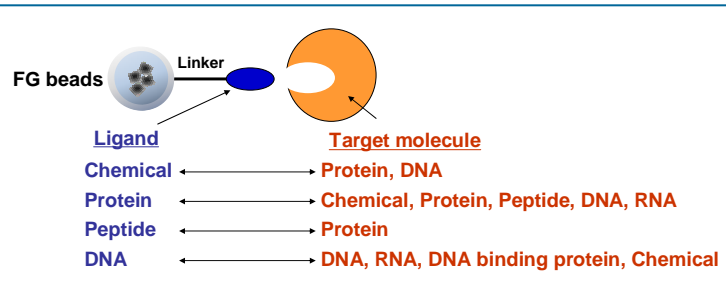
Non-specific adsorption is extremely low because the surfaces of FG beads are coated with a specially selected polymer, poly-GMA.



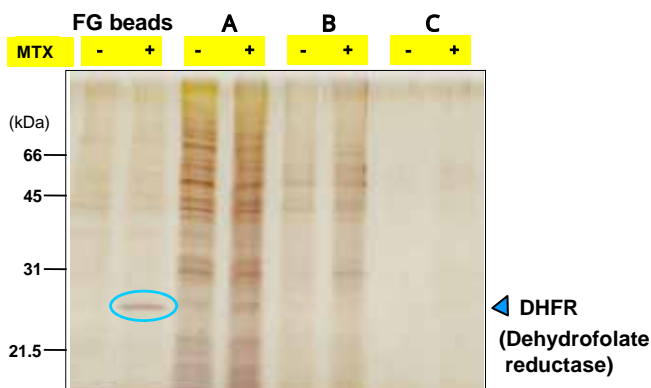
### Resistance to organic solvents

Ligands can be immobilized on the surfaces of FG beads in various organic solvents, such as methanol, DMF, DMSO, THF, ethyl acetate, pyridine, dioxane, toluene, dichloromethane, chloroform, etc.

Various ligands, such as chemicals (drugs), proteins, DNA, can be immobilized.



## Comparison with other magnetic beads

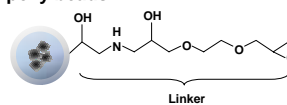


### Affinity purification of MTX binding proteins

Immobilization of MTX on commercial magnetic beads was done in the same manner as in the case of FG beads.

## Lineup of FG beads

### Epoxy beads

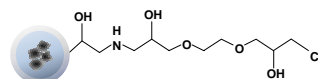


Ligands to be fixed

Reactive →

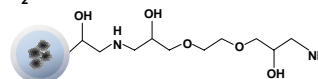
- R-NH<sub>2</sub> Amino group
- R-SH Thiol group
- R-OH Hydroxy group

### OH beads



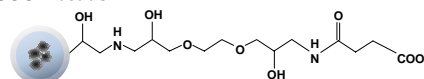
→ R-COOH Carboxyl group

### NH<sub>2</sub> beads



→ R-COOH Carboxyl group

### COOH beads



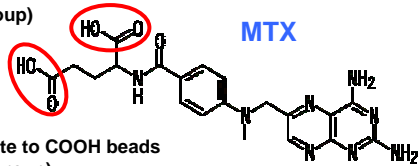
→

- R-NH<sub>2</sub> Amino group
- R-OH Hydroxy group

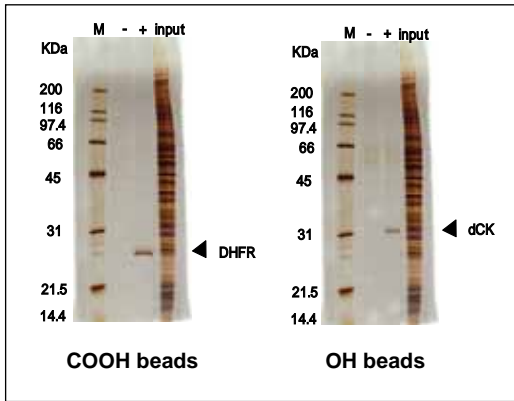
## Examples of screening

### Purification of novel target protein of MTX (methotrexate)<sup>2)</sup>

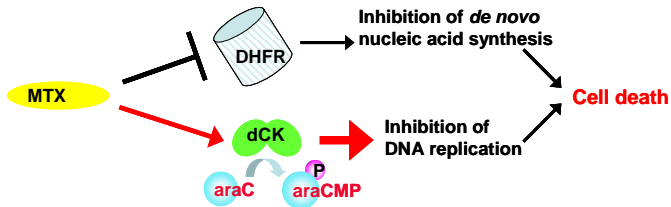
Fixation site to OH beads  
( $\gamma$ -COOH group)



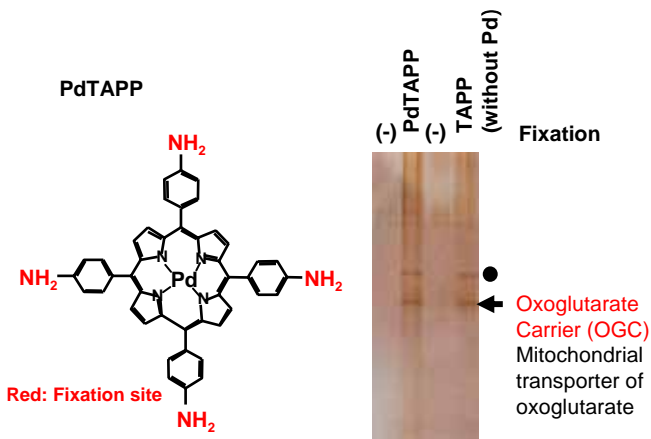
Fixation site to COOH beads  
( $\alpha$ -COOH group)



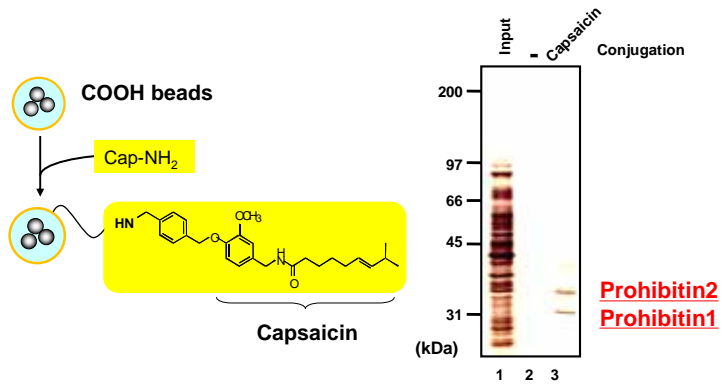
When MTX is fixed via  $\gamma$ -COOH, a novel protein is purified and identified as deoxycytidine kinase (dCK). As a result, a possible mechanism of synergistic effect between MTX and ara-C on malignant lymphoma was proposed.



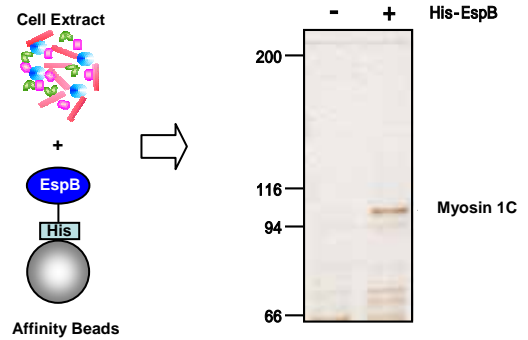
### Purification of target protein of porphyrin derivative<sup>3)</sup>



### Purification of target proteins of Capsaicin<sup>4)</sup>

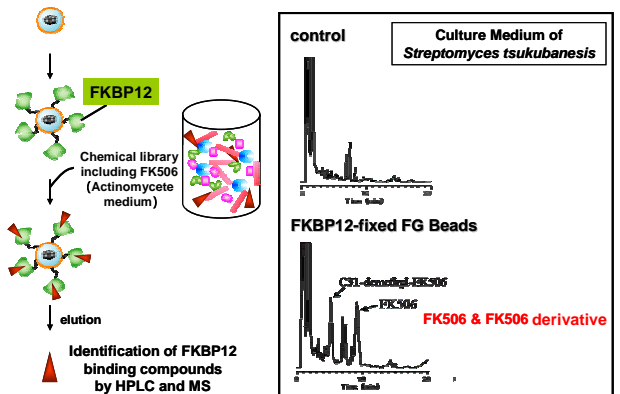


### Elucidation of the mechanism of enteropathogenic *E. coli* infection<sup>5)</sup>



EspB is a protein of enteropathogenic *E. coli* (EPEC) essential for infection in humans. Myosin is isolated from human cell extract using EspB fixed beads. As a result, the mechanism of EPEC infection was elucidated.

### Screening of chemical library<sup>6)</sup>



## References

- 1) K. Nishio *et al.*, *Colloids Surf. B: Biointerfaces*. 64 (2008) 162
- 2) H. Uga *et al.*, *Mol. Pharmacol.* 70 (2006) 1832
- 3) Y. Kabe *et al.*, *J. Biol. Chem.* 281 (2006) 31729
- 4) C. Kuramori *et al.*, *Biochem. Biophys. Res. Commun.* 379 (2009) 519
- 5) Y. Iizumi *et al.*, *Cell Host & Microbe*. 2 (2007) 383
- 6) Y. Ohtsu *et al.*, *Anal. Biochem.* 338 (2005) 245

For Technical Inquiries:

Tokyo Bio R&D Center

TEL +81-45-479-6121 FAX +81-45-479-6122

FGbeads@tamagawa-seiki.co.jp

www.tamagawa-seiki.co.jp

Tamagawa Seiki will be  
more than happy to serve you.

'09.5

This catalog was printed on May, 2009

Contents printed in this catalog are subject to change without notice.