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Nanobiocatalysis for Antifouling and CO_2 Conversion

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Abstract:

Enzymes have a great potential as an environmentally-friendly tool in solving various environmental issues, including membrane biofouling and atmospheric CO_2. Although environmentally-friendly nature of enzymes together with their specificity and various reactions to be catalyzed can provide a great potential in their environmental applications, the practical uses of enzymes are being hampered due to their poor stability. Nanobiocatalysis, using nanostructured materials for the stabilization as well as immobilization of enzymes, has gathered a growing attention due to its unprecedented successes in stabilizing the enzyme activity. This presentation will introduce recent developments of nanobiocatalysis using acylase and carbonic anhydrase, which have demonstrated the feasibility of successes in antifouling and CO_2 reduction, respectively. Acylase and carbonic anhydrase were immobilized on the carboxylated polyaniline nanofibers via a "magnetically-separable enzyme precipitate coatings (Mag-EPC)" approach. Enzyme stabilization in the form of Mag-EPC and their uses in antifouling and CO_2 reduction will be presented in detail. It is anticipated that nanobiocatalytic approaches can be employed for various enzyme applications by greatly extending the lifetime of enzyme activities.

Brief CV.

- *Birth*
  - *1964*
- *Education*
  - *B.S., Chemical Engineering, Seoul National University, Korea (1986)*
  - *M.S., Chemical Engineering, Seoul National University, Korea (1988)*
  - *Ph.D., Biochemical Engineering, University of Iowa, USA (1995)*
- *Present position*
  - *Professor, Department of Chemical & Biological Engineering, Korea University, Korea*
- *Area of research*
  - *Nanobiocatalytic enzyme immobilization and stabilization*
  - *Enzyme applications in enzyme-linked immunosorbent assay (ELISA), biosensors, biofuel cells, trypsin digestion, antifouling,*

and CO2 conversion/utilization (CCU)