ML 02

CONTROL OF SURFACE MORPHOLOGY OF POLYMER PARTICLES FOR BIOMEDICAL APPLICATIONS

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Composite polymer particles consisting of polystyrene (PS) and poly(2-hydroxyethyl methacrylate) (PHEMA) were prepared by emulsifier-free seeded emulsion polymerization of styrene with PHEMA seed particles. Similar particles can also be prepared by emusifire-free batch emulsion poymerization of styrene (S) and 2-hydroxyethyl methacrylate (HEMA). Both particles had clean, heterogeneous surfaces consisiting of hydrophobic (PS)/hydrophilic (PHEMA) parts, which were estimated by XPS and AFM measurements.

Figure 1 shows relationships between the amounts of trypsin, which is a protease, adsorbed on PHEMA/PS composite and various homopolymer particles and the specific enzymatic activity of adsorbed ones. In all homopolymer particles used in this study, the specific activities increased with increases in the amount of trypsin adsorbed, and "induction period", where trypsin adsorbed had no activity, shortened with an increase in the hydrophilicity of the particle surfaces. On the other hand, trypsin adsorbed onto the composite particles had no such an induction period and almost the same specific activity as free native ones. There was an optimum heterogeneous surfaces to be useful for the high adsorbance of enzymes due to hydrophobic phase and high enzymatic activity due to hydrophilic phase.

In the immunologic agglutinability of the composite particles sensitized with anti-BSA antibody in BSA antigen solution, similar results were obtained. That is, hydrophobic phase contributed to a good immunoactivity and the hydrophilic phase contributed to a good colloidal stability even at the step of sensitization with the antibody and to suppression of non-specifc agglutination.

It will be emphasised that the composite particles having hydrophilic/hydrophilic heterogeneous surfaces are useful as carrier for biomolecules in the biomedical fields.

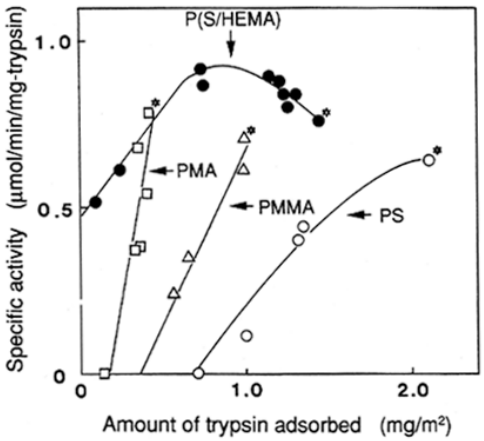

Fig.1