

Magnetic Nano-adsorbents for Industrial Bioproduct Purification

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The past years have seen a strong demand for innovative integrated bioseparation techniques capable of directly isolating and purifying biomolecules from crude feedstocks in a single unit operation. Liquid-liquid extraction using Aqueous Two-Phase Systems (ATPS) and the technical application of magnetic micro-adsorbents in combination with magnetic separators are two examples of such modern processes. Though both techniques exhibit a huge potential, their widespread adoption is hindered by a number of drawbacks. In our opinion, some of these could be overcome in a hybrid process based on integrating the two techniques by using magnetic nano-adsorbents in micellar two phase systems.

Problems encountered in working with ATPS all too often include the slow kinetics of phase separation, and insufficient partitioning coefficients for the target molecule. Employing magnetic micro- or nano-adsorbents combined with specially designed process equipment can drastically shorten the time required for phase separation. Moreover, the selectivity and capacity of the extraction phase can be tailored with respect to the designated application by entrapment of nano-adsorbents with a surface ligand selective for the target molecule.