

RSC Speciality Chemicals Symposium 2009: Catalysts for Change

Enzyme-Catalysis: Easy and Efficient

Pascal Duenkelmann,

Codexis, Germany

During the last decades scientists all over the world identified a vast variety of processes that allow the production of fine chemicals or pharmaceutical ingredients applying biotechnological methods. However, only a few processes are now applied in industry. The reason for this is that most of these bench processes suffer from unsatisfying efficiency. Producing fine chemicals or pharmaceutical ingredients by these syntheses is much more expensive than producing them by usual chemical methods. The fact that the production process is environmentally friendly and therefore expensive might be acceptable for certain compounds. For those fine chemicals that represent building blocks for the chemical or pharmaceutical industry this is a criterion for exclusion.

In many cases the technical issues of these methods result from an insufficient performance of the used biocatalyst. Its bad performance might be caused by a low enzyme stability, a low catalytic activity, a low selectivity, tedious work-up of the reaction broth and so on. Codexis approaches these problems with its enzyme platform technology, which uses a proprietary DNA shuffling process to evolve customized biocatalysts, or "super" enzymes capable of performing chemical processes according to a highly selective set of specifications. This technology creates new and smarter enzymes that improve chemical manufacturing processes. This technology is available for various classes of enzymes like alcohol dehydrogenases, transaminases, hydrolases, etc. Processes based on the application of these optimized enzymes meet requirements regarding economic efficiency (high substrate loading, short reaction time, conversion at ambient temperature, easy work-up) and environmental sustainability at the same time.