BIOTRANS
LA ROCHELLE 2023

N°827 / OC
TOPIC(s) : (Chemo)enzymatic strategies / Enzyme discovery and engineering

Peroxygenase-Catalysed Selective Oxidation of Silanes to Silanols

AUTHORS

Jacob VAN HENGST / DELFT UNIVERSITY OF TECHNOLOGY, VAN DER MAASWEG 9, DELFT

PURPOSE OF THE ABSTRACT

Silanols represent an important product class in organic chemistry as precursors for silicones, as catalyst components or in medicinal chemistry. Syntheses of the state-of-the-art typically start from already functionalised silanes such as chloro- or alkoxysilanes via hydrolysis and producing significant amounts of salt waste-products.

Less waste-intensive methods involving dehydrogenative, O2 or H2O2 dependent oxidation of non-functionalised silanols are rare. Even less common are biocatalytic methods for the conversion of
silanes. Recently, Arnold and coworkers succeeded in evolving a cytochrome P450-BM3 variant which dramatically increased catalytic activity towards a range of organosilanes

Inspired by these pioneering works, we asked ourselves whether so-called unspecific peroxygenases (UPOs) may also be suitable catalysts for this type of transformation. Particularly, we investigated the UPO from Agrocybe aegerita (AaeUPO) as silane oxyfunctionalisation catalyst. UPOs are attractive alternatives to established P450 monooxygenases as they enable drastically simplified, NAD(P)H-independent reaction schemes using simple H2O2 as stoichiometric oxidant (figure 1)

FIGURES

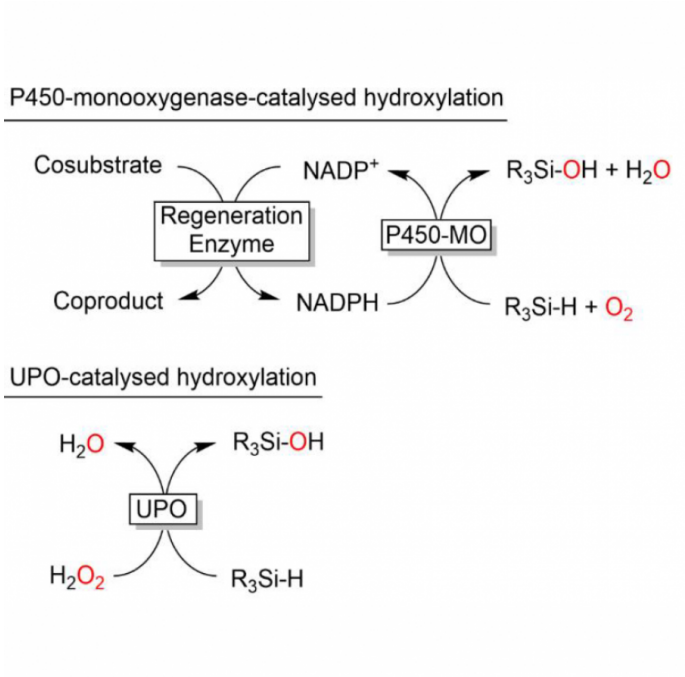

FIGURE 1

figure 1

Comparison of P450 monooxygenase and peroxygenase catalysed hydroxylation of silanes to silanols

FIGURE 2

KEYWORDS

peroxygenase | silanol

BIBLIOGRAPHY