

TailorMat[®] - Nanostructured Materials by Design using Supercritical Fluids

S.B. Iversen^{*}, M. Foverskov, R. Mateiu, and H. Jensen

^{*}SCF-Technologies, Gl. Koege Landevej 22H, 2500 Valby, Denmark

^{*}Corresponding Author: sbi@scf-technologies.com, +45 22102518

ABSTRACT

SCF-Technologies have established a technology platform for tailor-made nanostructured materials based on more than 20 years experience in the high pressure industry and an intensive effort in nanotechnology research. Using the special properties from supercritical fluids (high temperature and high pressure) combined with the knowledge from international leading nano-scientists SCF-Technologies provides solutions for nanostructured tailor-made materials – TailorMat[®]. SCF-Technologies uses patented supercritical technologies for the synthesis of nanostructured materials. The patented technology opens for custom-made materials as a function of size, shape, crystallinity, and purity depending on the requirements from the customer..

Keywords: Tailor-made materials, nanostructured, supercritical.

1 INTRODUCTION

Today it is clear that properties change drastically when going from bulk materials to nanostructured materials and a number of physiochemical properties are uniquely size dependent and change radically with the size.

SCF-Technologies have established a technology platform for tailor-made nanostructured materials based on more than 20 years experience in the high pressure industry and an intensive effort in nanotechnology research. Using the special properties from supercritical fluids (high temperature and high pressure) combined with the knowledge from international leading nano-scientists SCF-Technologies provides solutions for nanostructured tailor-made materials – TailorMat[®].

SCF-Technologies uses patented supercritical technologies for the synthesis of nanostructured materials. The patented technology opens for custom-made materials as a function of size, shape, crystallinity, and purity depending on the requirements from the customer.

The special features of SCF-Technologies supercritical technology for the synthesis of nanostructured materials enable the production of nanoparticles with controllable size, size distribution, and surface modification. Furthermore, the crystallization temperatures are lowered by a factor of 2-4 compared to traditional technologies and

no post heat treatment such as drying and/or calcination, is needed to obtain an active crystalline material.

SCF-technologies have proven its technology in three main areas within nanotechnology: Photocatalytic materials, chromatographic materials, and catalytic materials. In all three areas the main objective was to tailor properties for specific applications.

A wide range of nano-sized crystalline and partly crystalline metals and metal oxides with very small size and a narrow size distribution have been synthesized. The materials were synthesized in both supercritical water and supercritical CO₂ depending on the demand for the special application. The materials have proven a high efficiency in photocatalytic applications.

The high pressure technology have also been used to produce highly effective and active surfaces for chromatographic materials. The novel TailorMat[®] chromatographic materials are able to enhance efficiency and thus add more value for the end users. For analytical purposes, using SCF technology means greater analytical precision and shorter analysis times.

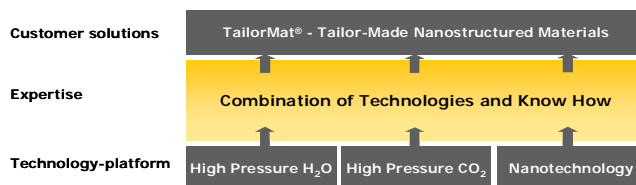


Figure 1. The technology platform for SCF-Technologies.

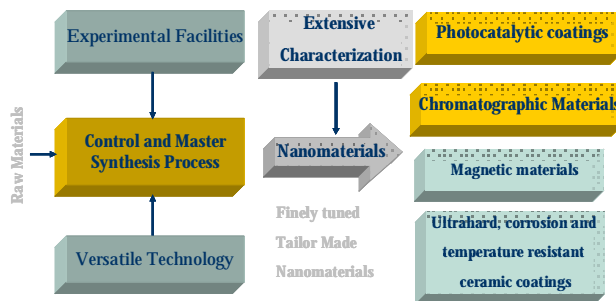


Figure 2. Current applications of the TailorMat technology.