

# 12<sup>th</sup> Euro Biotechnology Congress

November 07-09, 2016 Alicante, Spain



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*Nanomateriaux pour les Systemes Sous Sollicitations Extremes, France*

### Large-scale continuous manufacturing of nano-cocrystal drugs and therapeutics

NS3E laboratory developed the Spray Flash Evaporation (SFE) for preparing energetic organic nanoparticles at industrial scale. The energetic solution is kept in a pressurized tank separated from a vacuum chamber by a hollow cone nozzle, used both to heat and spray the liquid. The instantaneous evaporation of the solvent originates from the combination of the abrupt pressure drop and the high energy stored by the overheated solvent prior to nebulization. The flash evaporation leads to small crystallites with narrow size distribution. The nanoparticles may be composed of single compounds, mixtures of several substances or co-crystals. The idea to transport these findings to the medicine became evident. In this domain, co-crystals are of critical importance as they enhance bioavailability and up-take by the human body of Active Pharmaceutical Ingredients (API). Up to now, most used techniques are of batch nature and not able to give access in big amounts to nanosized crystals or co-crystals of therapeutic interest. The SFE permits the continuous manufacturing of nanosized co-crystals, in large amounts with a kinetic complying with the pharmaceutical industry's requirements. The efficiency of SFE was shown by the manufacturing of nano-cocrystals based on caffeine/oxalic acid (2/1) and caffeine/glutaric acid (1/1) with a mean particle size of 60 and 100 nanometers respectively. SFE currently used to produce nano-cocrystals, offers other promising prospects at the interplay between medicine and energetics that will be highlighted in this conference.

### Biography

Habil. Denis SPITZER received his in physical chemistry in 1993 at the University Louis Pasteur of Strasbourg. He is the founding and current Director of the NS3E Research Laboratory UMR 3208 ISL/CNRS/UNISTRA. He conducts research in continuous nanocrystallization processes of organic nanomaterials such as model medicaments and energetic materials. He is the inventor of the SFE process. He is the author of more than 150 publications and scientific reports. He received in 2013 the award of strategic thinking given by the French Homeland Minister, and more recently, in 2015, the « Grand Prix Lazare Carnot » award of the French Academy of Science, for dual use research.

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