CV
Björn Sivik

Björn Sivik was borne 1947 in Uddevalla, Sweden. In 1979 he became Dr of Technology in Applied Food Engineering at the Faculty of Engineering (LTH), Lund University, Sweden and in1992 he was appointed Associate professor in Food Technology.

Björn Sivik started to explore the supercritical carbon dioxide technology in 1985 and this has been one of his main research areas since then. The research has also included the development of technical equipment as a prerequisite in the development of the technology of supercritical carbon dioxide extraction.

Equipment

An unavoidable part of research work is the development of new equipment. In this case this has meant the assembly of units for laboratory work and pilot plant extraction for solid as well as liquid extraction.

It also means the construction of various extractors for special tasks like handling very small samples as well as very big samples, extractors equipped with stirring for enzyme reactions, extractors with packing for liquid/liquid extraction.

Research

The research has focused on the following principal types of applications:

- Utilisation of the solubilising power of supercritical carbon dioxide ($SCCO_2$) for non polar and/or volatile compounds:
  - Extraction of oil from oil seeds,
  - extraction of aroma compounds from flowers or fruits,
  - "Chemical laundry" with CO_2,
  - sample preparation in analytical chemistry,
  - $SCCO_2$ as carrier gas in Gas or Liquid chromatography,
  - deoiling of machined components, debinding of MIM products.

- Purification of polar compounds like phospholipids by extraction of non-polar compounds.

- Utilisation of polar co solvent mixed with $SCCO_2$ in order to solubilise slightly polar compounds.

- Selectivity of $SCCO_2$ for i.e. difference in solubilising power for different non polar compounds depending on volatility:

  - for example short fatty acids are extracted at low pressures but not long fatty acids,
  - supercritical distillation,
  - purification of oil from dioxins and PCB's.

- Creation of a non polar environment for enzyme reactions with lipases as synthesis of mono-, di-, and triglycerides from fatty acids and glycerol. The reaction rate is increased due to reduced viscosity of fats in $SCCO_2$.

- Utilisation of $SCCO_2$ as both medium and solvent for lipase reactions with non polar compounds with simultaneous synthesis and removal of non polar or highly volatile reaction products.
- Utilisation of the combination of solubility of solid non-polar compounds and drastic pressure release as micro particle formation of for example high melting fats.

- Utilisation of the combination solubility of volatile solvent or film forming polymer and drastic pressure release as micro encapsulation.

- Pasteurisation of liquids like orange juice and other microorganism reducing tasks.

A selection of publications concerning supercritical technology:

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- Miliauskas,G; VenskutonisP.R; Sivik B; Extraktion of aromatic and medicinal plants with supercritical carbon dioxide Workshop on Food Quality Science and Technology, Kaunas Lithuania June pp 209-213, 2001.

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- H. Gunnlaugsdottir, K. Wannerberger and B. Sivik (1998). Alcoholysis and glyceride synthesis with immobilized lipase on controlled-pore glass of varying hydrophobicity in supercritical carbon dioxide. Enzyme Microb. Technol. 22:360-367.

- H. Gunnlaugsdottir, M. Järemo and B. Sivik (1998). Process parameters influencing ethanolysis of cod liver oil in supercritical carbon dioxide. J. Supercrit. Fluids 12:85-93.

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