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In chromatography since several years it is observed the trend to reduce the particle size of the adsorbent used as packing in chromatographic columns. This is due reduced mass transfer resistance inside the porous adsorbent particles, which has the consequence, inter alia, in shorten the retention time of analytes. In this way, a new chromatographic technique now known as the English acronym UHPLC (ang. ultra-high pressure liquid chromatography). The second chromatographic technique that allows to perform measurements with a relatively short times SFC (ang. Supercritical fluid chromatography) and is now also subject to high interest.

However, in both the above mentioned chromatographic techniques, a significant temperature gradients in UHPLC due to viscous friction medium temperature increases, while the SFC fluid is cooled as a result of its expansion. Changes in temperature, especially in the radial direction have their adverse consequences in terms of reducing the efficiency of the chromatographic column. This may affect negatively, on the time needed to do a separation.

Thus, the research made in order to know the reasons and above all to develop the possibility of eliminating or at least limiting temperature changes in the chromatography column are reasonable and most importantly have practical significance.

Recently a new type of chromatographic columns appears, wherein the stationary phase consists of an adsorbent made of a carbon core surrounded by a thin film composed of nanoparticles of diamond. These columns are interesting because of materials that have been applied and above all, their coefficients of thermal conductivity which is much larger than in conventional chromatography columns. This increases of the effective thermal conductivity of the column should reduces the formation temperature gradient within a chromatography column.

Research of this project is intended to thoroughly test these columns mainly in terms of their efficiency, adsorption thermodynamics and kinetics of heat and mass transport.

In essence, it will be experimental research in the field of chromatography, UHPLC and SFC combined with mathematical modelling.