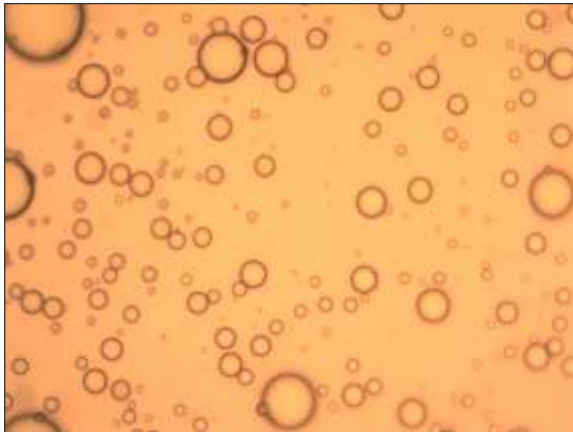# OIL-IN-WATER ANALYSIS. Verification of Particle Counter results by optical microscopy.

Dr Andrzej Krasinski
Warsaw University of Technology
Faculty of Chemical and Process Engineering

For my research work, which concerns separation of liquid/liquid dispersions, I selected the Spectrex PC2200. It covers the whole range of droplet sizes which are of interest, i.e. from 0.5 to 100 microns. The procedure for analysis is very simple and results are obtained in less than a minute. This makes the Spectrex instrument very handy for use in the lab as well as for field measurements (A portable model, PC-2300, is available).

Initially I faced some problems with dilution of my water samples using distilled water. What I observed was very intense, apparent noise, showing up as high counts, even when I run my analysis with "pure" water samples. However, by checking with the sealed, particle free standard provided with the unit, it appeared that in fact it was not the noise of the device, but that the quality of my distilled water was very bad (probably because of the limestone precipitated and eluted from the distillation equipment). I decided to dilute my samples with RO water and this solved the problem. The background count for RO (*reverse osmosis*) water was still non-zero, but reasonably low and this enabled me to carry out a size analysis of my samples of oil-in-water dispersions.

To confirm the robustness of the particle size analysis by the PC2200, I verified this with optical phase contrast microscopy. After taking a number of microphotographs, I performed size analysis of the objects (droplets) as images. The procedure for manually sizing hundreds of droplets is very labor intensive, but it matched the Spectrex analyses quite well.

The example photo on the left shows the oil-in-water dispersion with mean droplet size of 5.21 microns from microscopy vs. 4.94 micron from Spectrex counting.

Based on my experience, I can recommend the PC2200 as a very easy-to use device, which gives reliable results very quickly, and provides good operational practice when particle free diluents are used. In the majority of cases, to avoid coincident counts, I find I have to dilute my samples, so a particle free diluent is strongly recommended.