**Ethylene Grycol Di-Stearate (EGDS) micrometer size crystal formation by using supercritical $CO_2$**

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EGDS(Ethylene Glycol Di Stearate) is used as pearlescent agent and opacifier in shampoo, bath lotion and other cleaning or cosmetic products. The requirement as a product is lamellate crystal with smooth surface and adequate size of several ten micrometers.

The EGDS crystals are conventionally produced from organic solutions via precipitation, filtering and drying processes. Since the conventional methods cannot avoid the large energy consumption and particle aggregation during, there is a strong demand on a new methodology which is environmental benign, capable of reducing the aggregation and controllable of morphology.

In this study, aerosol solvent extraction system (ASES) with supercritical $CO_2$ was applied to produce fine crystals from the cyclohexane solutions of EGDS. Firstly we measured the solubility of EGDS in supercritical CO2 at 40 and 50 C and 10 MPa so that we can tell how much the supersaturation is during the ASES experiment. .

The ASES exeperiments have been carried out with a high pressure cell equipped with a helical ribbon impeller. The cell was initially pressurized by compressed CO2 and then EGDS cyclohexane solution of desired concentration was fed into the cell with a certain flow rate. We changed the flow rate of feed, EGDS concentration, temperature, and pressure and discuss their effects on the obtained EGDS crystal morphology. The morphology of EGDS lamellate crystals was characterized by 2 parameters; surface roughness and aspect ratio defined as thickness/longest diameter.

The results indicated that supercritical CO2 could minimize the usage of organic solvent and that the higher temperatures, lower pressures and low flow rates/EGDS concentration of feed solutions could be suitable to produce the larger smooth crystals of EGDS.