Assistant Professor Morteza Dejam Has Established the High Pressure/High Temperature Differential Scanning Calorimetry (HPHT DSC) to Experimentally Study the Phase Behavior of Fluids Confined in Nanoporous Media

The established High Pressure/High Temperature Differential Scanning Calorimetry (HPHT DSC) in Dr. Morteza Dejam's laboratory, which requires a small amount of sample with a test vessel volume of 8.5 ml, can measure samples in a wider range of operating conditions than other existing instruments, and therefore works well for many applications such as catalysis, carbon dioxide sequestration, drug delivery, enhanced coalbed methane recovery, pollution control, and separation, as well as hydrocarbon production from shale and other tight formations. This DSC can operate under either vacuum, atmospheric, or pressurized conditions, with a pressure limit of 600 bar and a temperature range of -196 to 200ºC. The 3D calorimetric sensor has a resolution of 0.1 μW and the sub-ambient cooling measurement is performed using liquid nitrogen cooling device.

This DSC is the preferred DSC because in the study of the phase behavior of many light hydrocarbons in nanopores, such as in shale formation, the temperature of measurement could be well below -70ºC, which is impossible to be performed in other existing instruments. For a mixture of light and longer hydrocarbons, on the other hand, would require an operating condition higher than 150ºC, which is beyond the capability of other existing instruments, but still within the operating temperature range of the established DSC in Dr. Morteza Dejam's laboratory. This DSC has the sensor resolution of 0.1 μW, which is the case for most DSCs available in the market.

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