# Development of ultrasmall nanoprobes for high sensitivity $^{19}$F MRI

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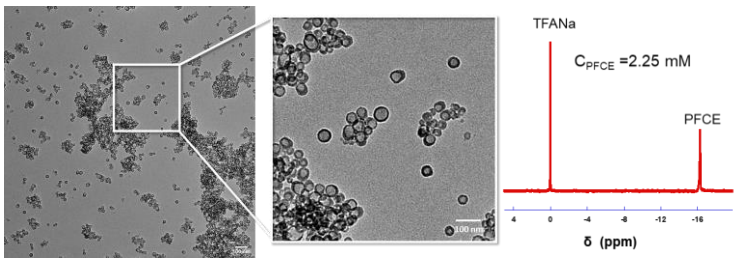
Among all the imaging techniques, magnetic resonance imaging (MRI) is of great interest due to its high sensitivity, deep penetration, and noninvasiveness. $^{19}$F MRI is an especially powerful tool for bio-imaging benefiting from its negligible background.
Our laboratory has developed FLAME (Fluorine Accumulated silica nanoparticle for 19F MRI Enhancement), a novel $^{19}$F MRI nanoprobe enabling efficient $^{19}$F MRI *in vivo* [1, 2]. FLAME has a core-shell structure that liquid perfluorocarbon is coated in silica shell. The structure brings the probe high sensitivity and increased surface modifiability. Despite all the favorable properties, the delivery efficiency of FLAME to cancer tissues is not satisfied. The reason is considered to be the size influence that modified FLAME reach up to 100 nm. Therefore, it is considered necessary to prepare nanoprobes with smaller size.
By suppressing the factor of size increase during nanoparticle synthesis[3], I managed to synthesis core-shell nanoparticles with size distribution of 25 nm to 35 nm (data obtained from TEM). Peak in $^{19}$F NMR confirmed successful encapsulation of perfluorocarbon (PFCE). TEM image indicated the clear formation of core-shell nanoparticle structure. The novel ultrasmall nanoprobe is expected to be used for high sensitivity *in vivo* $^{19}$F MRI.

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