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### Nanofuels: Preparation, stabilization and combustion

Rakhi N Mehta<sup>1,2</sup>, Mousumi Chakraborty<sup>2</sup> and Parimal A Parikh<sup>2</sup>

<sup>1</sup>Sarvajani College of Engineering and Technology, India

<sup>2</sup>S V National Institute of Technology, India

Nanofuels are suspensions of pure energetic nanomaterials in a liquid fuel that act as a potential energy carrier and release a large amount of heat when being oxidized. Energetic metallic additives offer high enthalpy of combustion, facilitating transportation of more payloads per unit fuel volume. Such mixtures have been reported to show advantages, such as increased energy density, high burn rates and enhanced energy release than the base fuel. But the physical stability of fuels containing nano size energetic additives is a major concern. Hence, special preparation techniques are required to produce nanofuels with high suspension stability and uniform nanoparticle distribution in continuous liquid phase. Current work discusses the formulation of nanofuels by stabilizing nano metallic particles in petro-diesel. Nanoparticles were stabilized by ultrasonication and addition of surfactant Span 80 (0.1 wt%). Diesel fuel containing nano-energetic additives (n-Fe, n-Al and n-B) showed stability for 8, 18 and 24 hours, respectively. Suspension stabilities of nanofuels were verified by spectrophotometer plots and backscattering profiles. Measured calorific values showed an increment of 12%, 7% and 2% respectively on combusting diesel doped with 1% of n-Al, n-Fe and n-B. Compression ignition engine performance showed reduced specific fuel consumption, peak cylinder pressures and CO emissions however brake thermal efficiency and NO<sub>x</sub> increased. Size analysis of soot produced was carried out using Dynamic Light Scattering (DLS) which supported the visual inspection by SEM microphotographs.

### Biography

Rakhi N Mehta has completed her PhD from Chemical Engineering Department, Sardar Vallabhbhai National Institute of Technology, Surat. She is Head of Chemical Engineering Department at Sarvajani College of Engineering & Tech., Surat and in the field of Research since last 6 years. She has published 7 papers in reputed international journals such as *Fuel*, *International Journal of Hydrogen Energy*, *Industrial & Engineering Chemistry Research*, *Applied Nanoscience*, *Petroleum Science & Technology* to name a few. She has been serving as a Technical Advisor on the board of many chemical industries.

[rakhi.mehta@scet.ac.in](mailto:rakhi.mehta@scet.ac.in)

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