

3D03: FUEL EFFECTS ON COMBUSTION PRECESSES IN AN HSDI DIESEL ENGINE USING ADVANCED INJECTION STRATEGIES.

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In converting the luminosity to a relative soot concentration, you really need to address the temperature effect on the radiation. I think you said the flame temperature for biodiesel is generally lower than for diesel. This could easily mitigate the differences in luminosity in converting to soot volume fraction. Could you comment on this? Also, why did you apply a fuel injection pressure of only 800 bar?

**Reply by Tiegang Fang**

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The soot luminosity is a combined effect of soot concentration and flame temperature. It should be careful when converting luminosity to soot concentration. There was a good paper showing that "Spatially integrated natural luminosity (SINL) has been found to vary linearly with soot volume fraction in a reacting fuel jet for several fuels and over a range of charge-gas temperatures" [1]. However, we did not overstate the soot luminosity as soot concentration in our paper and presentation. For the flame temperature of biodiesel fuel, the flame temperature might be a little bit higher than diesel fuel due to more oxygen in the reaction [2], however, there is no unanimity reached in the literature. We did not mention lower flame temperature for biodiesel fuel in the paper and presentation. As for the injection pressure, since the conditions are at low load under 1500 rpm, a relatively lower injection pressure would give lower NO<sub>x</sub> emissions. Of course, higher injection pressure is interesting to study for multiple injection strategy.

References:

[1] C.J. Mueller, W.J. Pitz, L.M. Pickett, G.C. Martin, D.L. Siebers, C.K. Westbrook, SAE paper 2003-01-1791.

[2] M. Lapuerta, O. Armas, J. Rodriguez-Fernandez, *Progress in Energy and Combustion Science* 34 (2008) 198-223.