# Effects of particle coatings on laser induced incandescence

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In exhaust plumes and under some combustor conditions soot particles are often coated with unburned fuel, sulfuric acid, water, ash, and other combustion by-products.[1,2] Diesel particles, for example, can be comprised of as much as 50% volatile compounds.[3] These coatings can have an effect on particle optical properties and can thus have an influence on optical diagnostics applied to coated particles. The effects of particle coatings therefore need to be fully understood in order to apply optical diagnostics under a wide range of conditions.

We have compared time-resolved laser induced incandescence (LII) measurements on uncoated soot generated in a coflow diffusion flame with LII measurements on heavily coated soot generated in a fuel-rich premixed flame. Soot was extracted and cooled from both flames, and a thermodenuder was used to vary the coating on the particles extracted from the premixed flame. A scanning mobility particle sizer (SMPS) was used to monitor aggregate sizes from the two flames, and transmission electron micrography (TEM) was used to characterize particle morphologies. The results demonstrate striking differences in LII temporal evolution and dependence on laser fluence between coated and uncoated particles. These results can be understood in the context of particle energy balance during heating and cooling and are consistent with predictions based on an LII model that includes a heavy organic coating.

## References

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