

**INVERSE CHARACTERIZATION OF NANOPARTICLE CLUSTERS USING
UNPOLARIZED OPTICAL SCATTERING WITHOUT EX-SITU MEASUREMENTS**

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ABSTRACT. Characterization of nano-structures is considered for many applications such as nanomanufacturing or detection of emissions. Although there are high resolution imaging techniques available, such as TEM and SEM, these techniques are not often available or applicable. Optical characterization via light scattering can be considered as a promising alternative to the existing techniques. In this study, feasibility and limitations of characterization of nanostructures using light scattering experiments without using polarization information or ex-situ particle size or number measurements will be investigated through numerical experiments. The considered problem is an inverse problem formulated as a least squares minimization problem. The study focuses on particle clusters in the form of soot aggregates and discrete dipole approximation will be used to solve the direct problem. As problem topology is prone to multiple extrema, using gradient based methods can be problematic and Tabu Search algorithm is used.