

Abstract Submitted  
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**Kinetics of carbon clustering in detonation of high explosives:  
Does theory match experiment?** KIRILL VELIZHANIN, JOSHUA COE, Los Alamos National Laboratory — Chemical reactions in detonation of carbon-rich high explosives yield solid carbon as a major constituent of the products. Efforts to theoretically describe the kinetics of carbon clustering go back to the seminal paper by Shaw and Johnson, where it was modeled as a diffusion-limited irreversible coagulation of smaller clusters into larger ones. However, first direct experimental observations of the kinetics of clustering yielded cluster growth one to two orders of magnitude slower than theoretical predictions. Multiple efforts were undertaken to test and revise the basic assumptions of the model in order to achieve better agreement with experiment. In this talk I will discuss our very recent direct experimental observations of carbon cluster growth in detonation of high explosives, based on time-resolved small-angle X-ray scattering (TR-SAXS). I will focus on comparison of these results to simulations using the modified Shaw-Johnson model and demonstrate that these new results are in much better agreement with the model than before. The implications of this much better agreement on our present understanding of in-detonation carbon clustering processes and possible ways to increase the agreement between theory and experiment even further will be discussed.

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