Characterizing the growth to detonation in PETN and HNS with small-scale PDV cutback experiments

SAND2015-8218C

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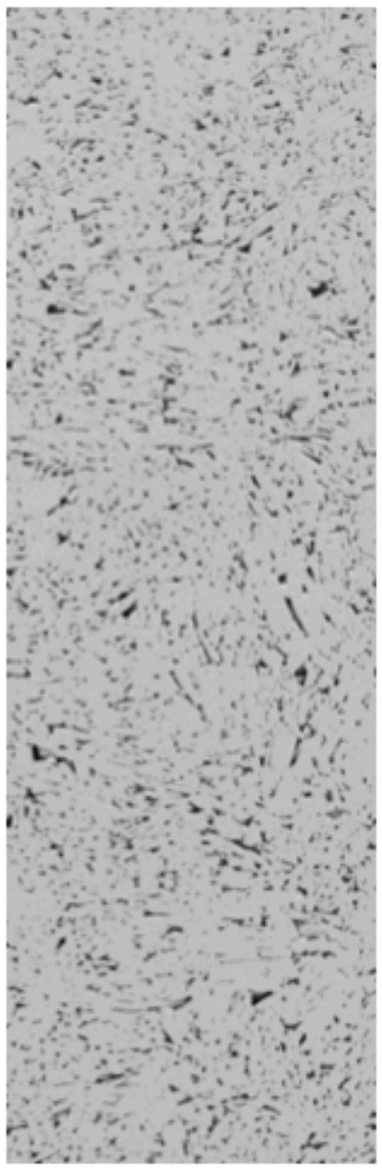
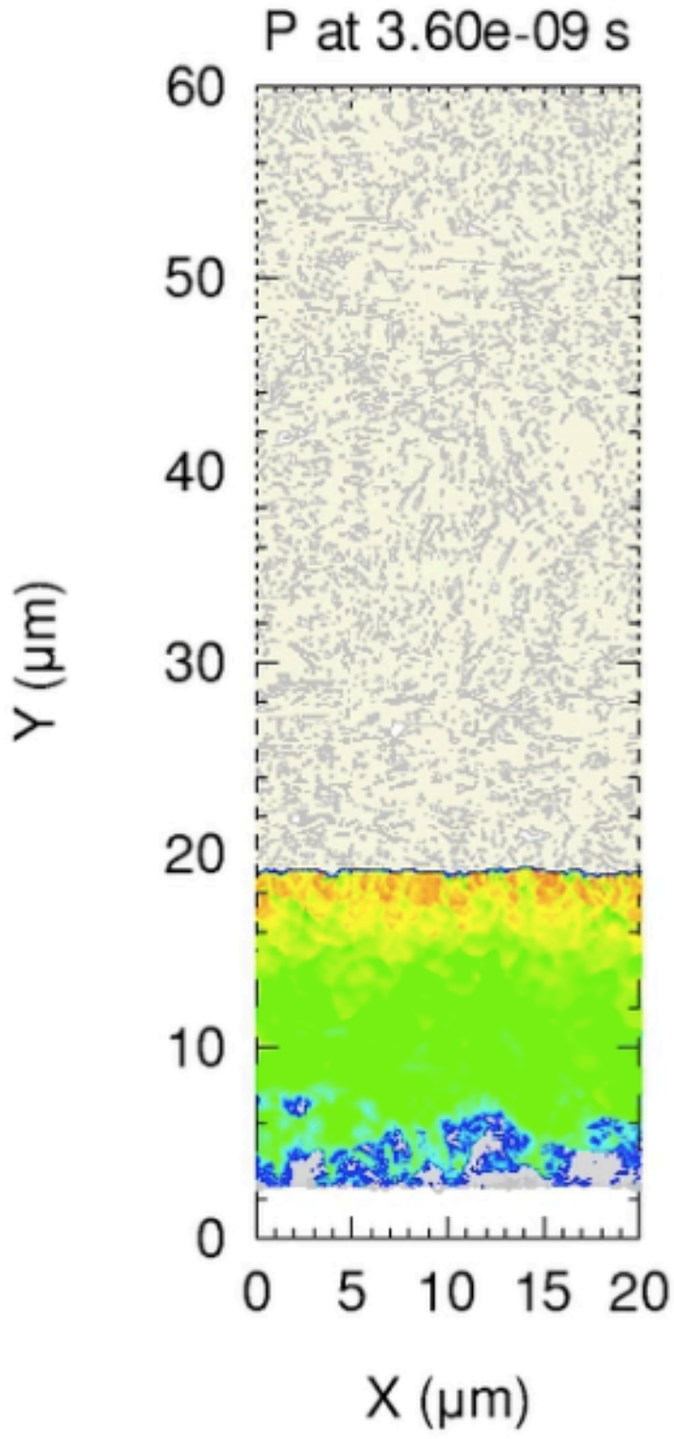
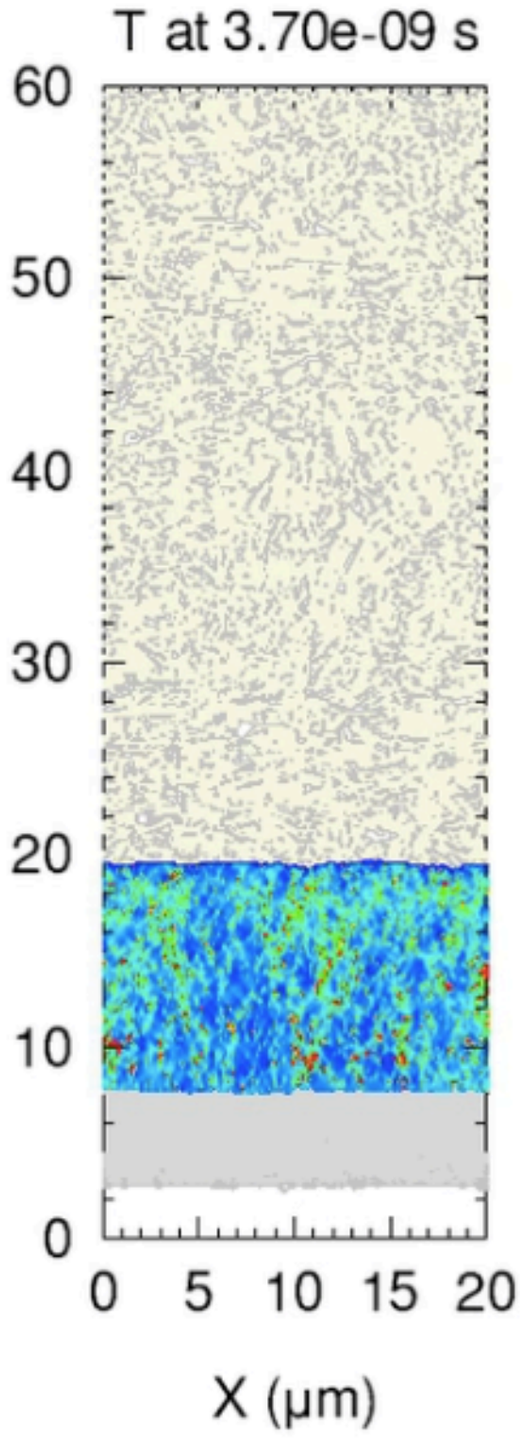
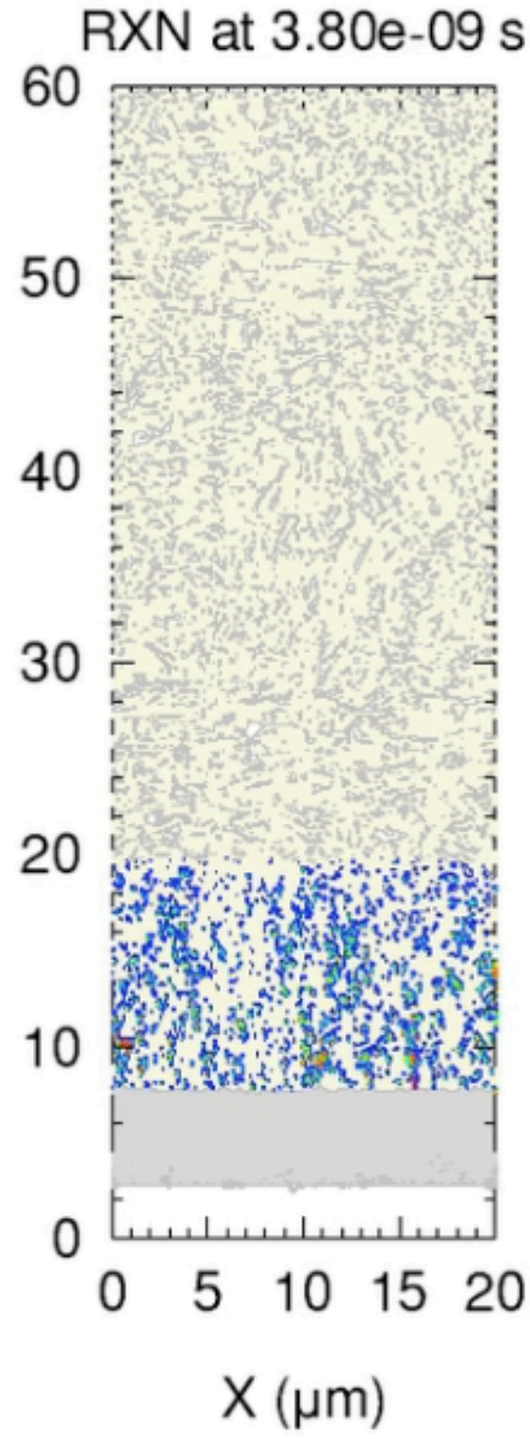
Mesoscale simulation of HNS initiation



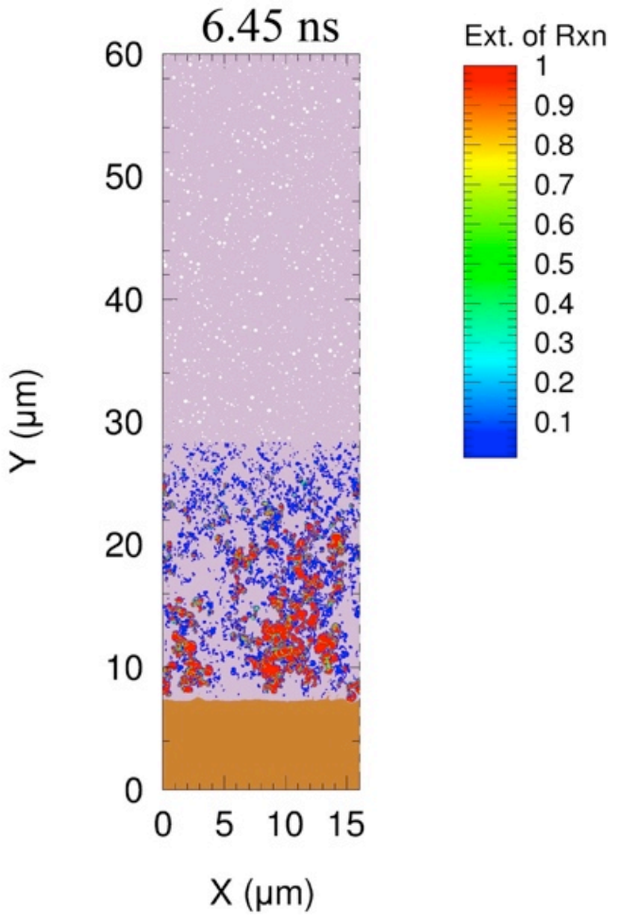
SEM image

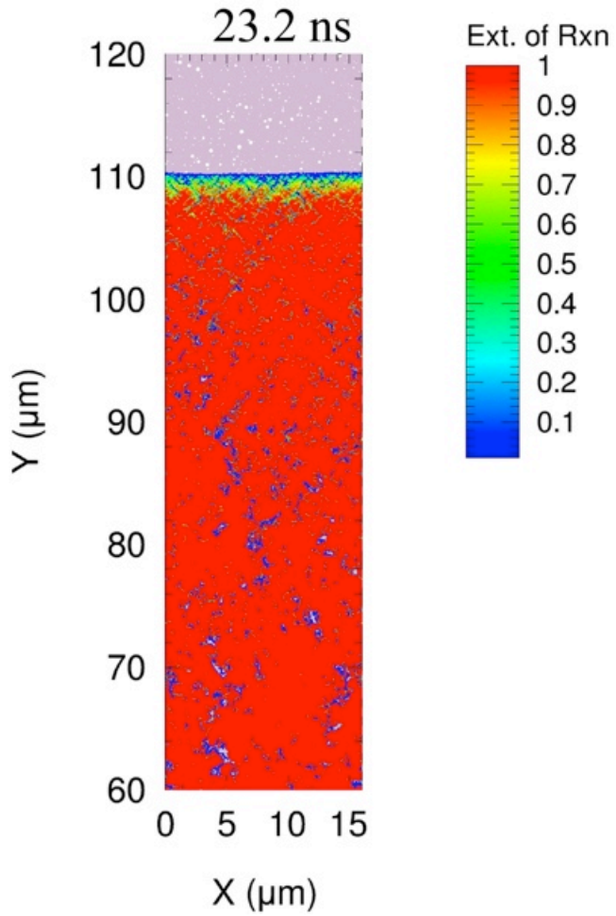


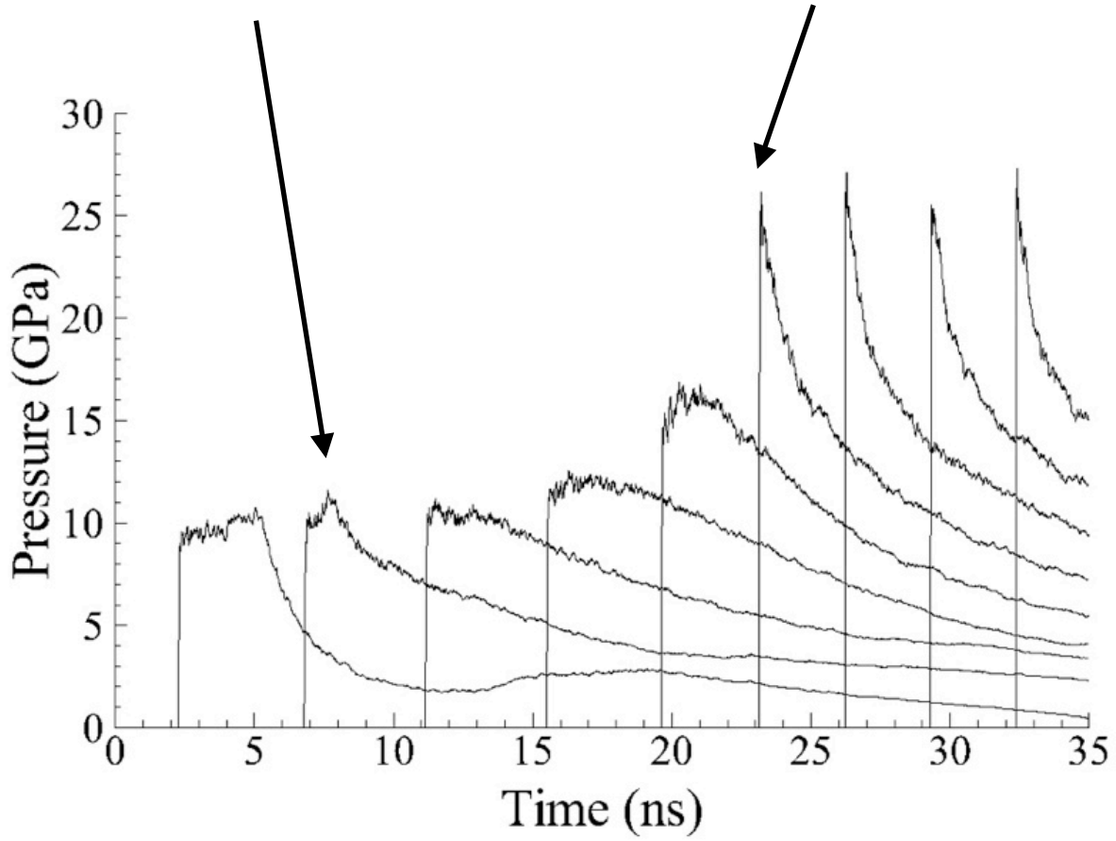




How do we validibrate our simulation?

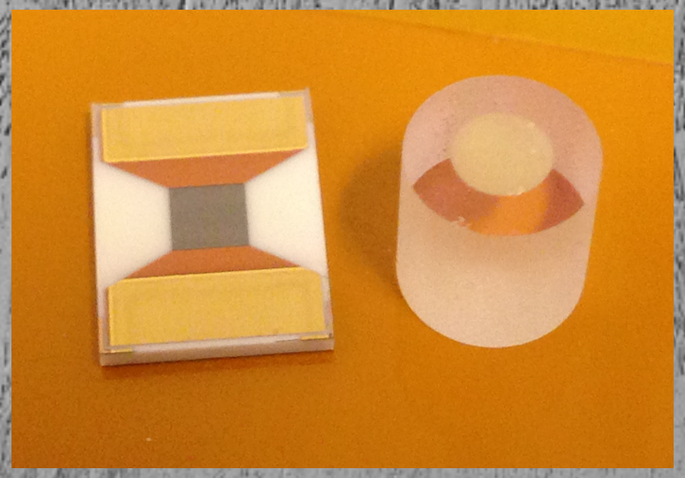


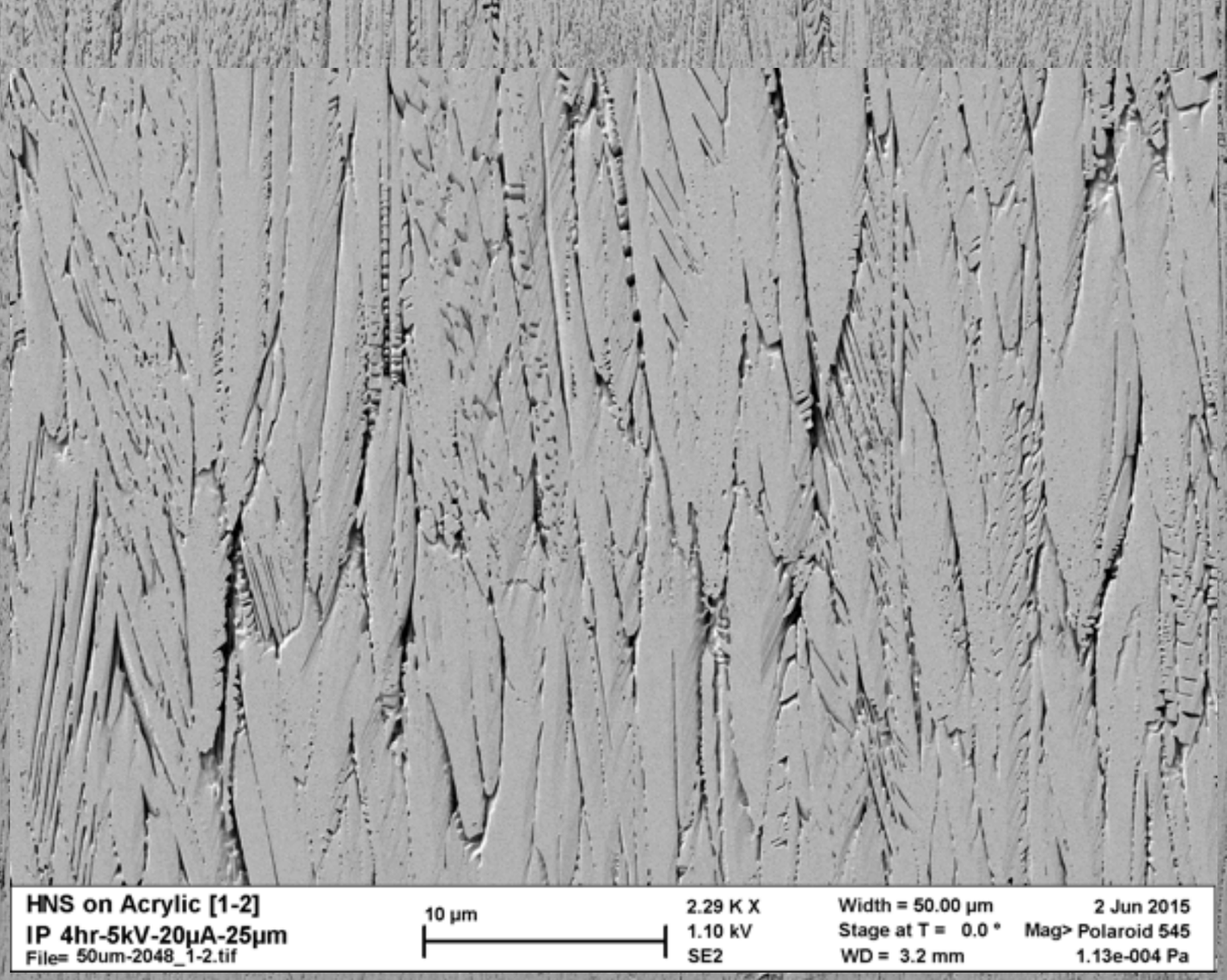




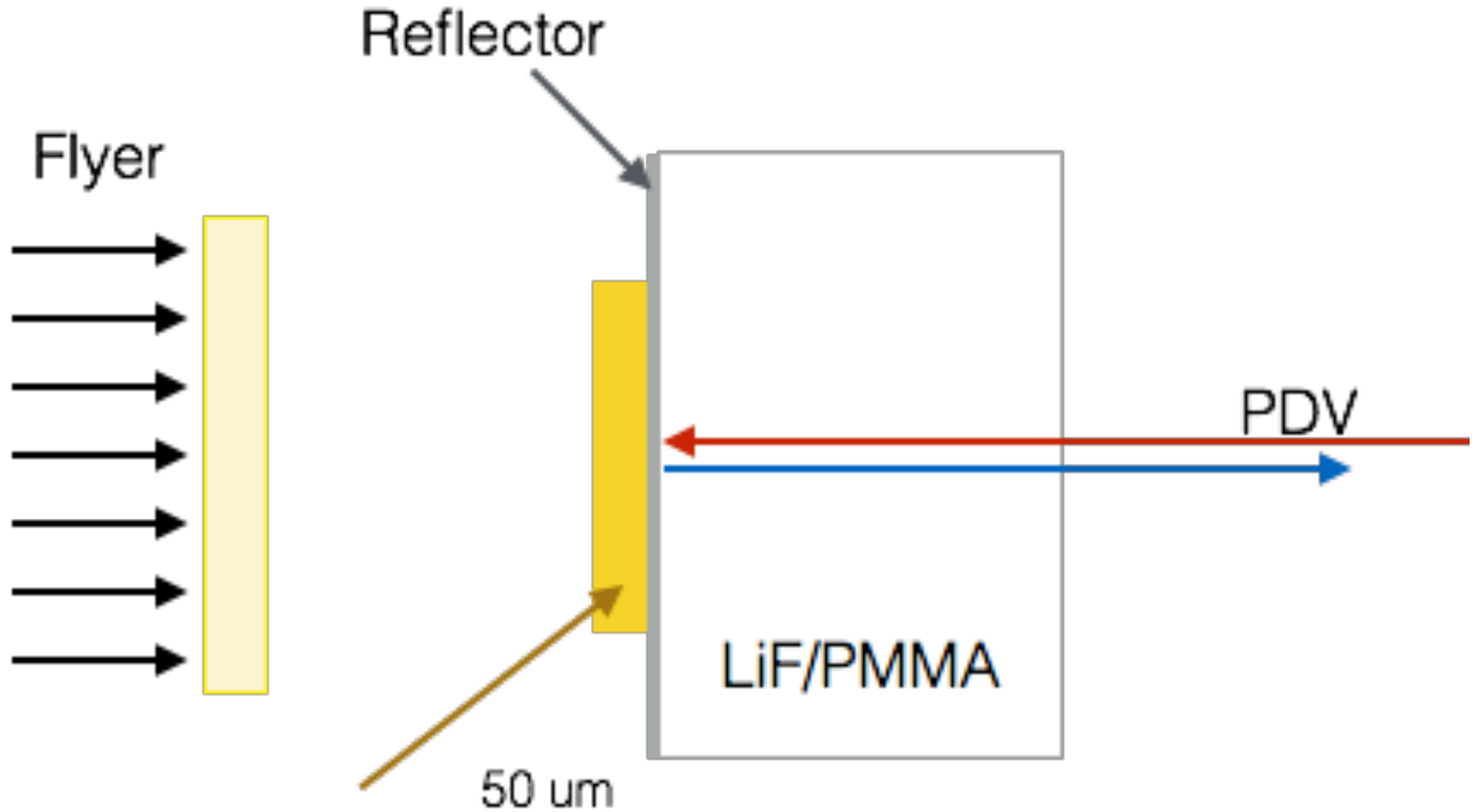
Embedded gauge ? No.
Gas Gun ? No.

Samples: Vapor-deposited HNS (50-200um thick)



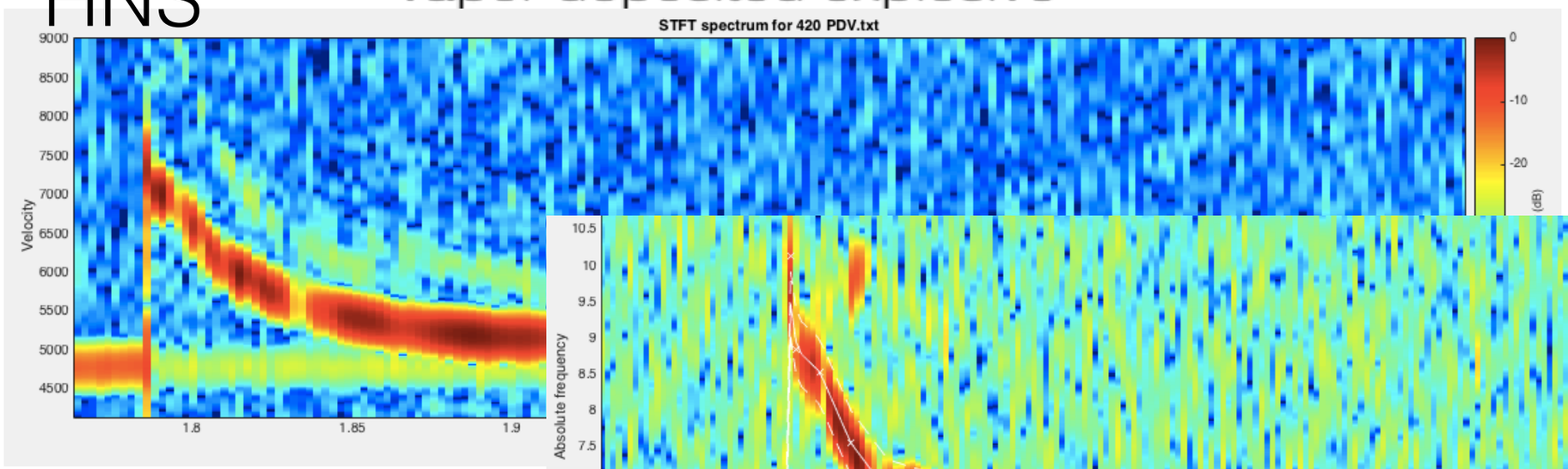


PDV experiments

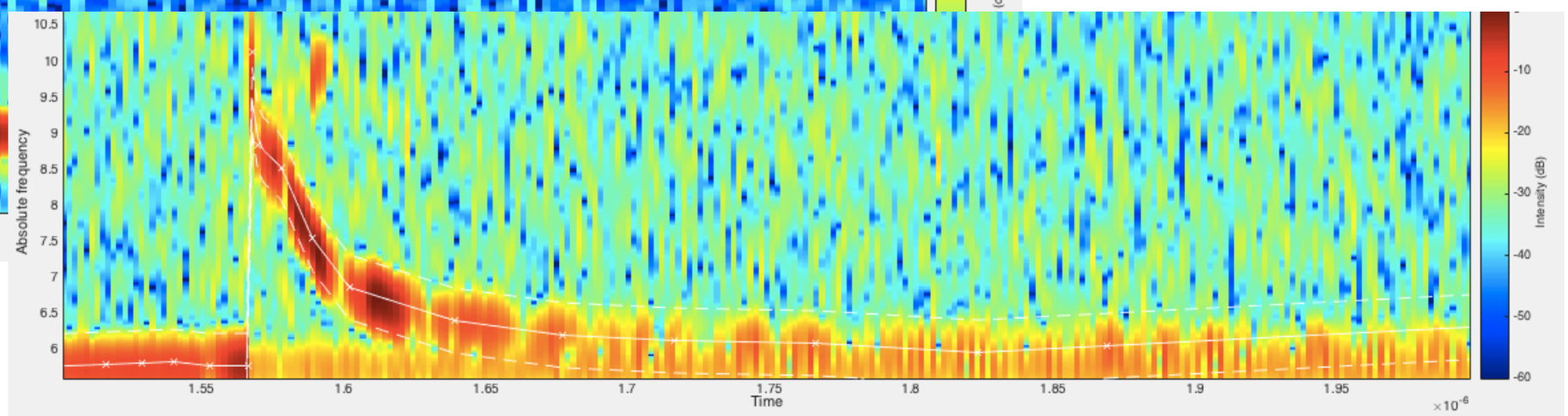


Vapor deposited explosive

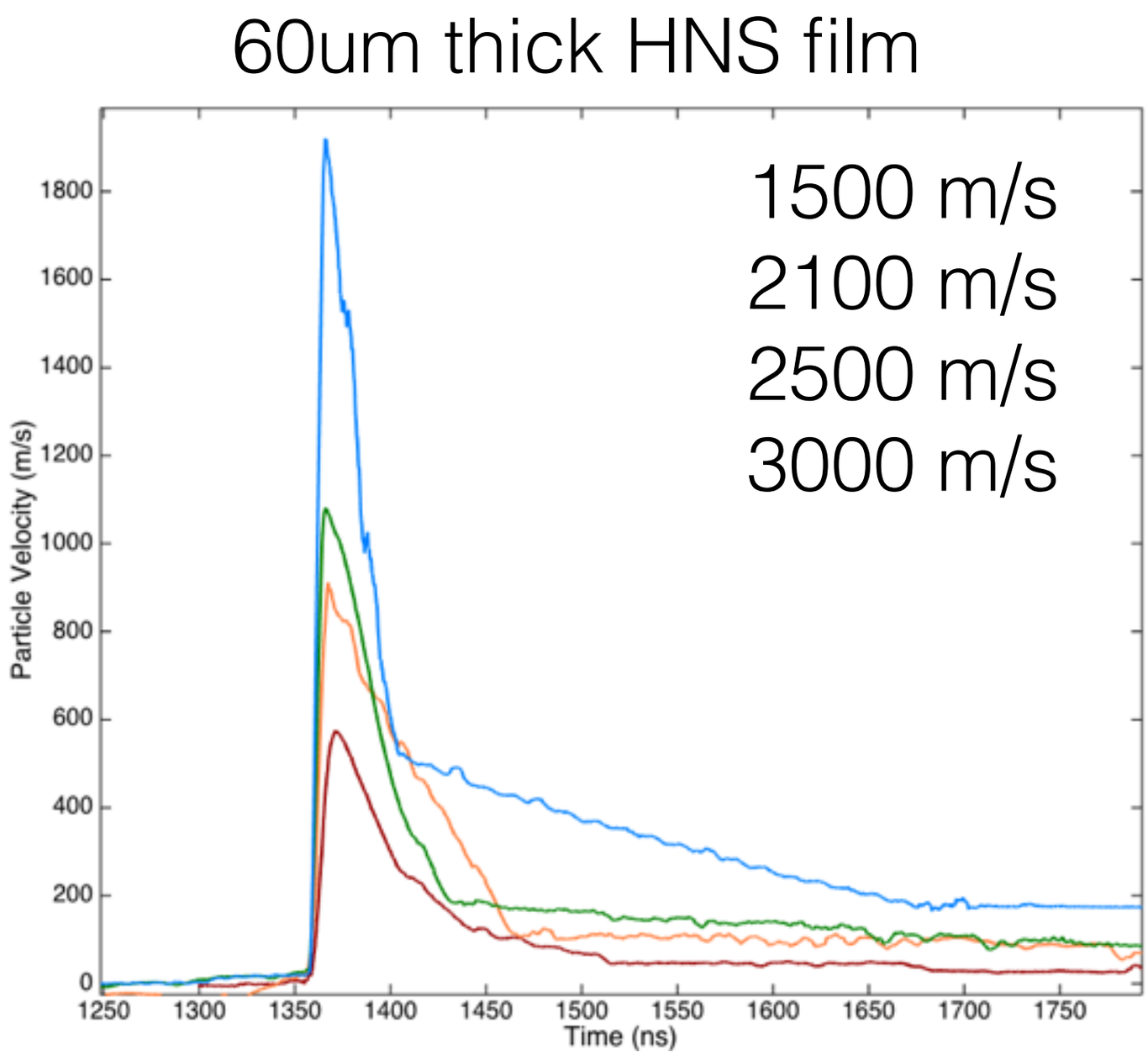
HNS



PETN



Velocity histories from HNS/PMMA interface



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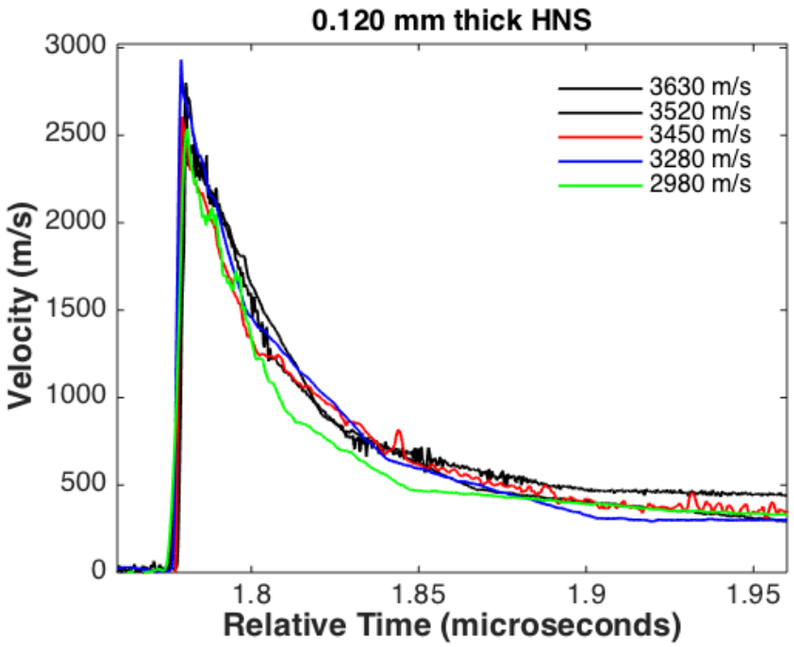
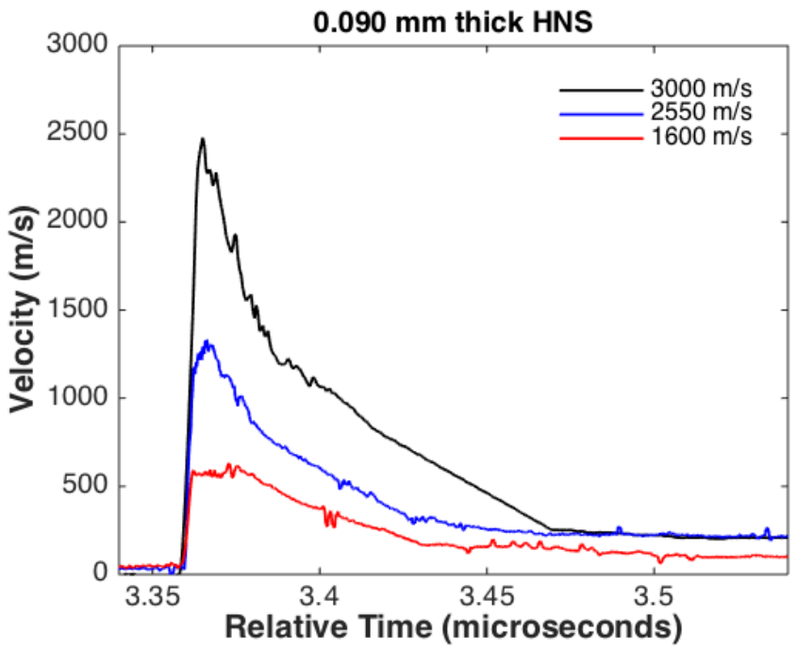
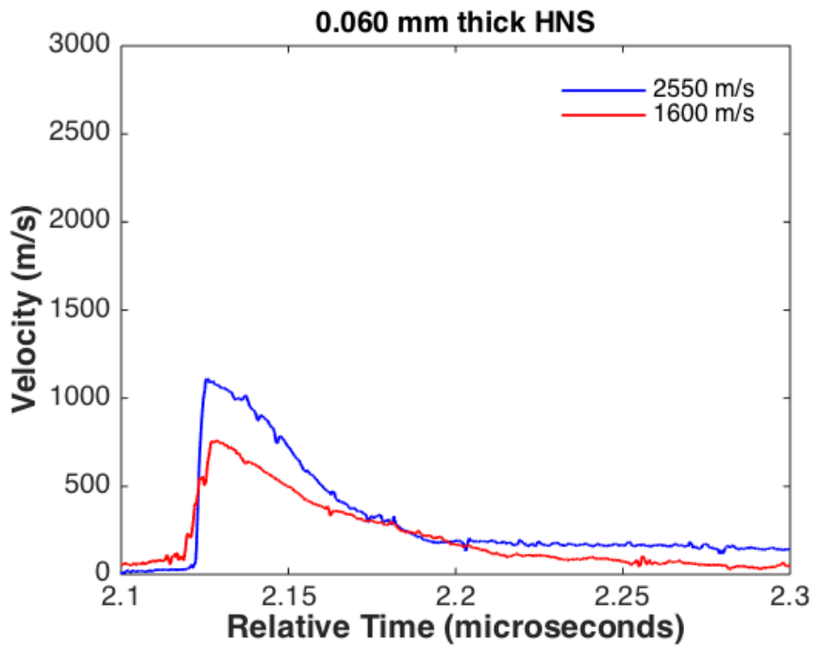
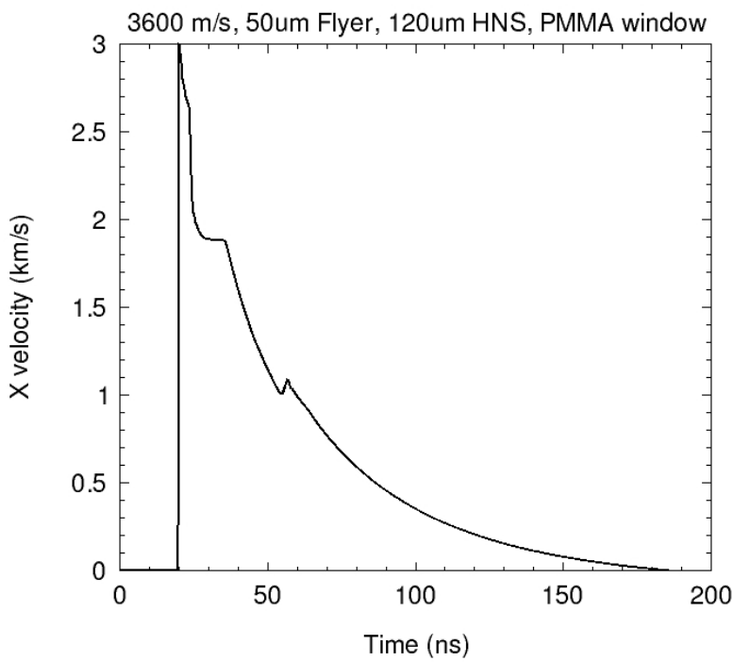
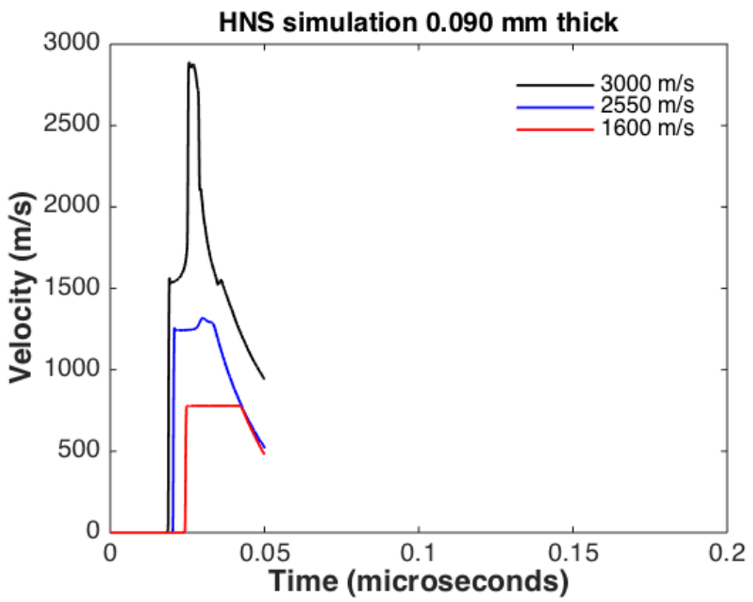


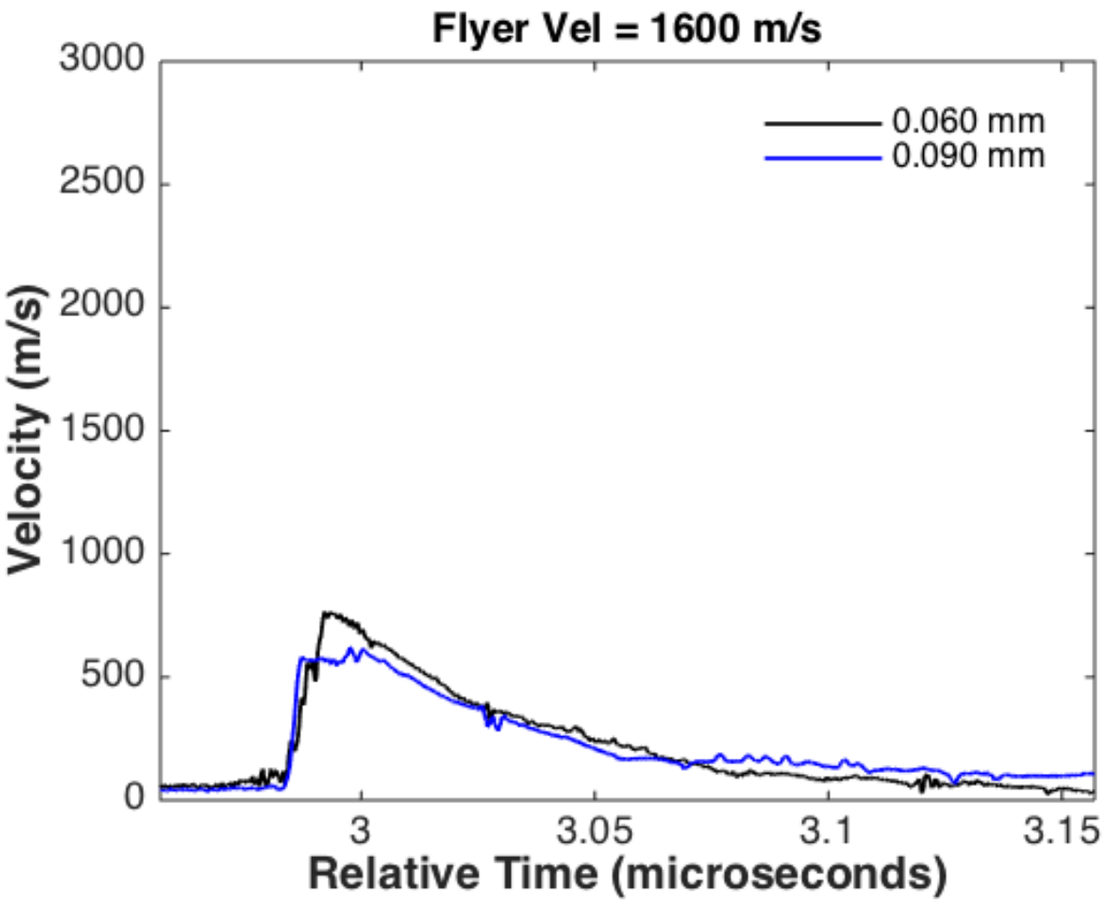


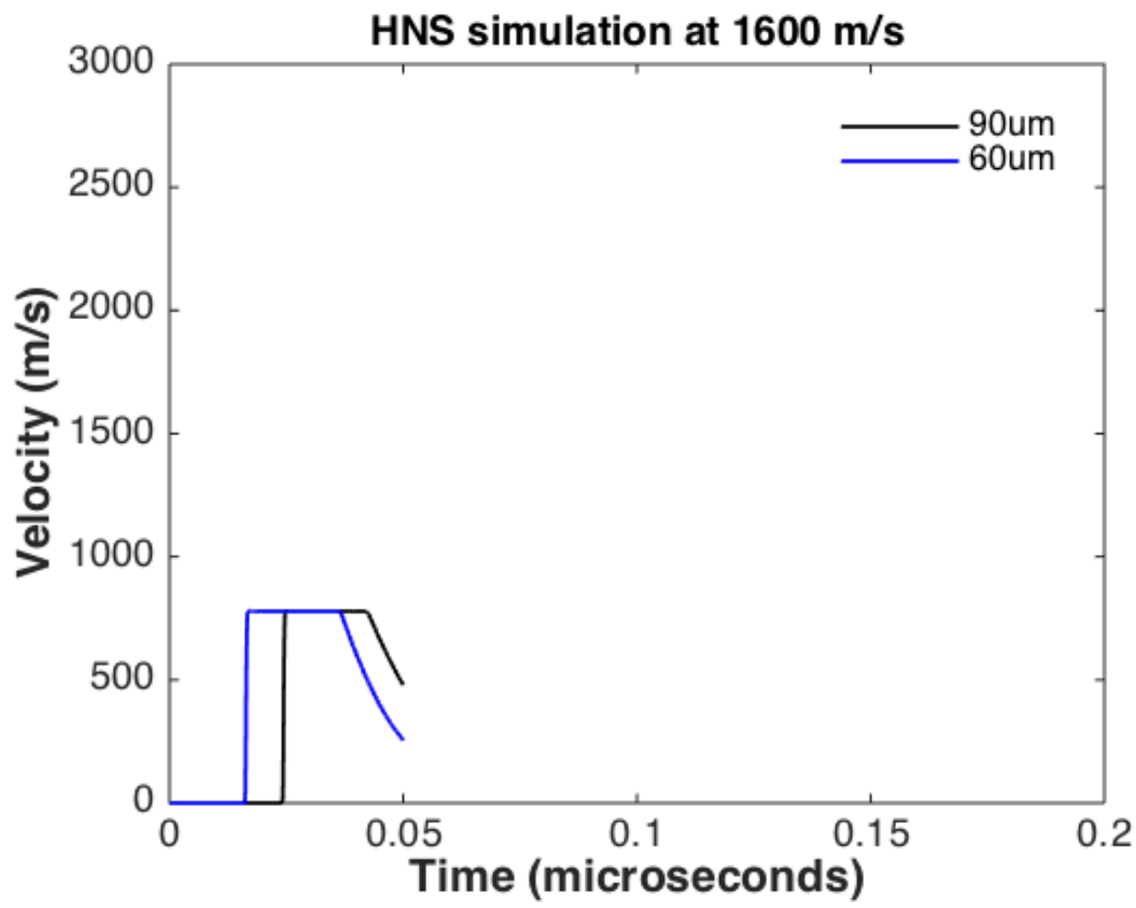




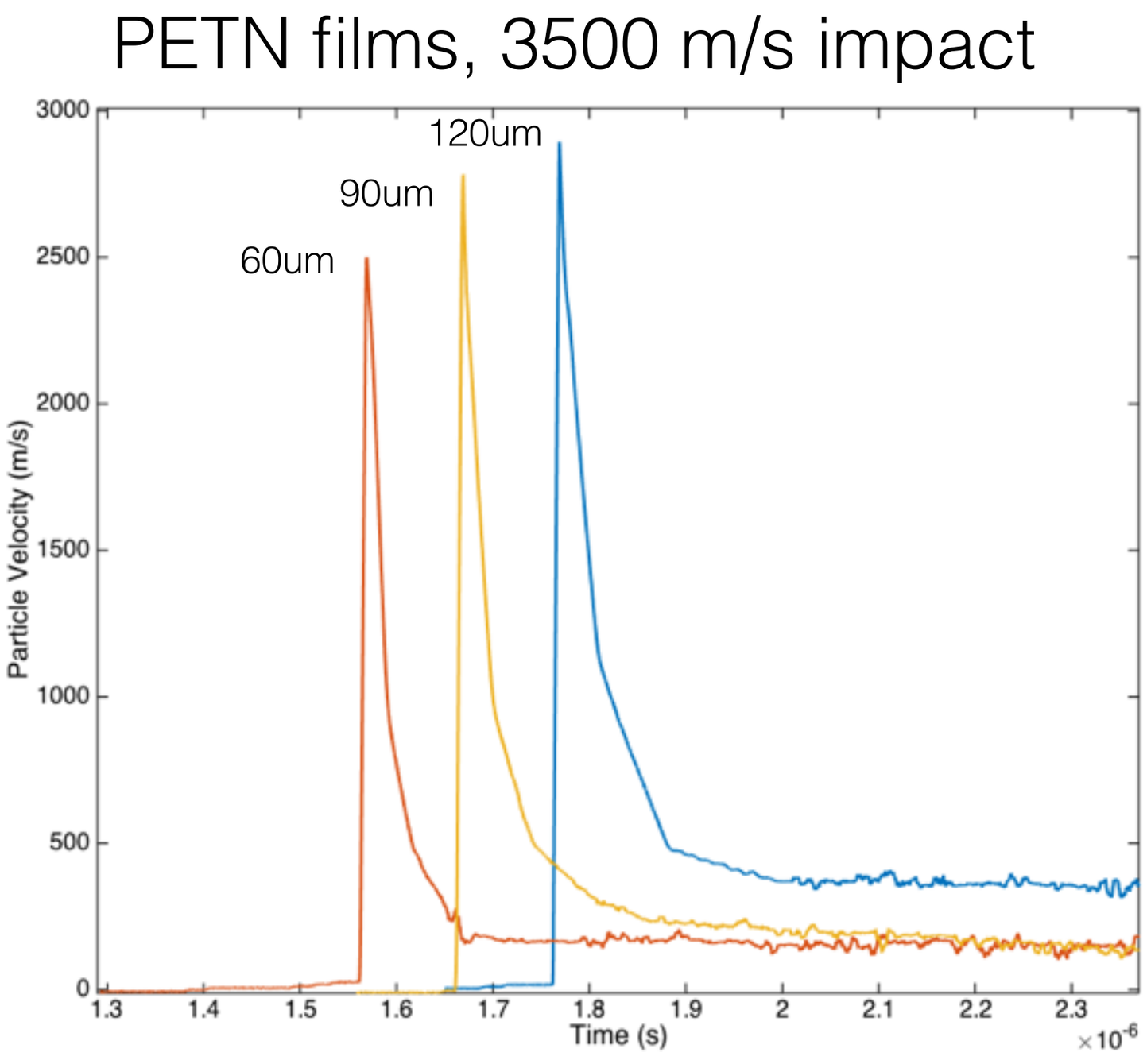


Velocity histories from HNS/PMMA interface





Velocity histories: from PETN/PMMA interface



Summary

We used PDV to capture the the build-up to steady detonation in flyer initiated HNS and PETN at the micron/nanosecond scale.

These data will be used to evaluate the appropriateness of currently available reactive-burn models for hydrocode simulation.

PDV from lower velocity flyer impacts show transit of an inert shock, which might be used to evaluate the unreacted equations of state used to model these materials.