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Title: Nanocarbons formed under extreme conditions: The role of atmosphere during detonation of Composition B

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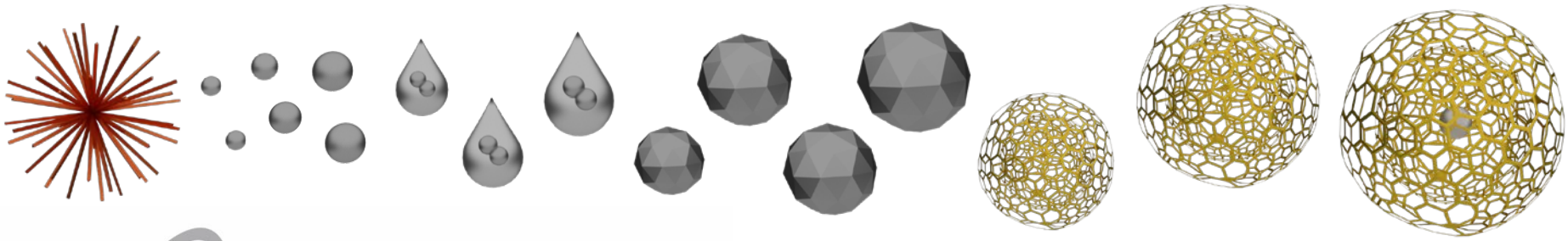
Nanocarbons formed under extreme conditions: The role of atmosphere during detonation of Composition B



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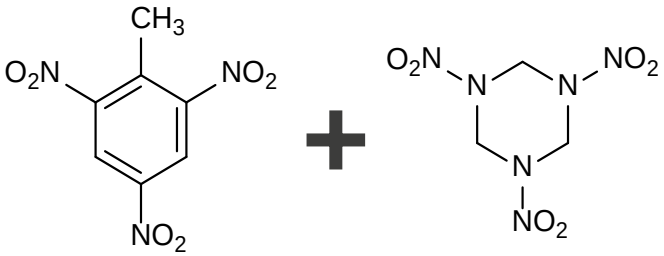
High explosive (HE) detonations produce various carbon allotropes due to temperatures, pressures and environmental conditions



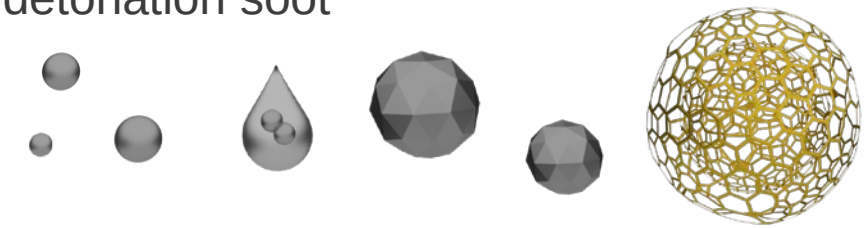
TNT (40%) RDX (60%)
Composition B

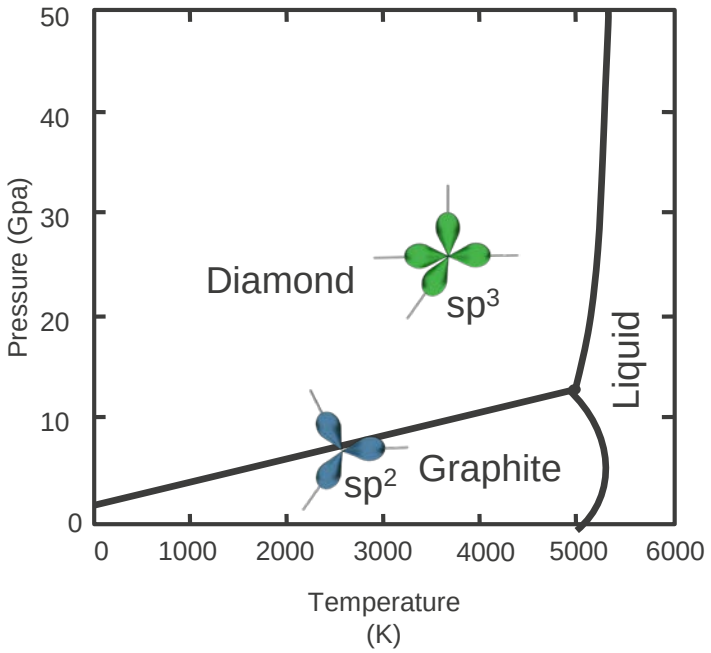
Solid Carbon Products
(Nanodiamonds/Graphite/Amorphous Carbon)

+

Gases
(N_2/H_2O/CO_2/CO)

- Detonation produces a dense fluid of molecular gases and solid carbon
- Pressure (*P*) and temperature (*T*) and environmental conditions dictate chemical transformations
- Specifically studying unaltered post detonation soot

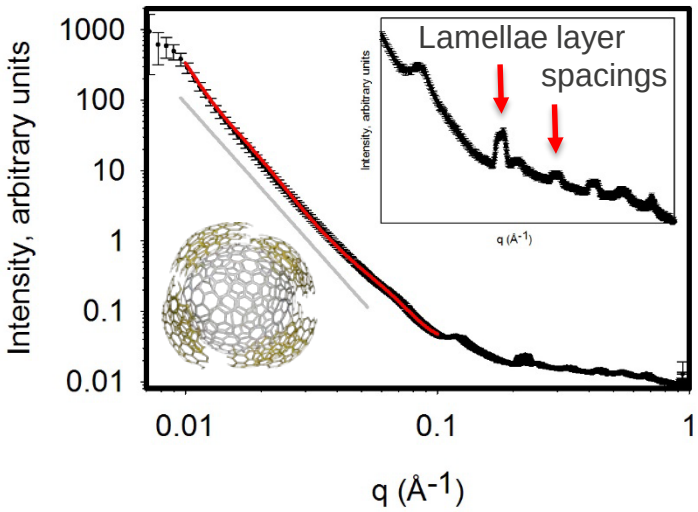




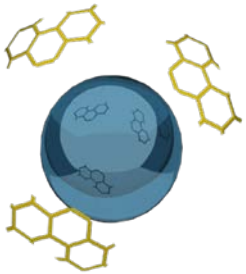
Core-shell structures observed from detonation of Comp B, suggests an additional synthesis route for carbon allotropes during detonation

Small angle X-ray scattering (SAXS): determine morphology and size of the system

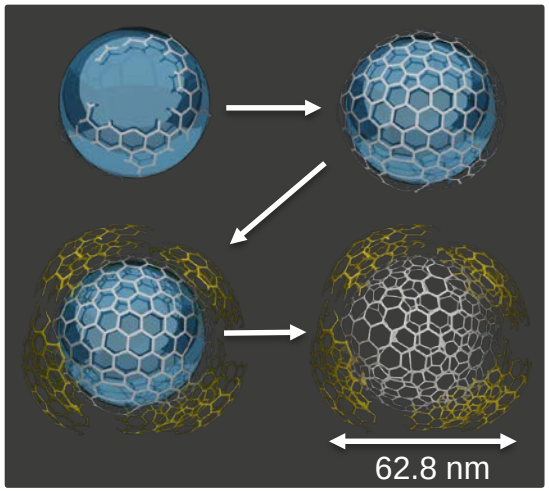
Form factor fit: analytical equation that is dependent upon geometry and scattering length density of the system



Our working hypothesis:



Poly aromatic hydrocarbons form around bubbles/voids



Why this is important to detonation sciences:

- Main component of soot previously reported as nanodiamonds and onion-like carbons (after harsh acid treatments)
- Theoretical models are based on coalescence of carbon into diamond (sp^3) then further oxidation of the system results in lower forms of carbon (sp^2 and sp), not possible synthesis for hollow structures
- Provides an new pathway for carbon allotrope formation in detonations

Next step:

- Analyze TR-SAXS data to learn more about synthesis pathway
- Analyze unaltered post detonation soot from other detonation materials