Shock-wave / Detonation Synthesis of Nano-Diamonds

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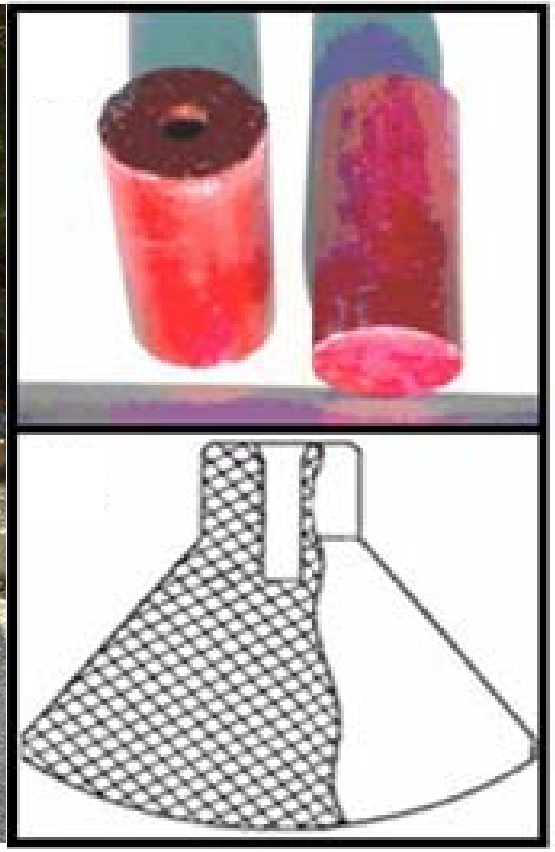
Synthesis and Properties of Nanodiamonds:

1. Mean size of ND nanoparticles → 4 ÷ 12 nm
2. Maximal size of ND aggregates → 60 nm
3. High surface to volume ratio → ~400 m^2/g
4. Stability of ND water suspension → up to 30 days
5. Extremely high purity with respect to heavy metal contamination (especially important for biomedical applications)

Detonation camera for ND synthesis



Different shapes of explosive charges

- tested to obtain ND with desired properties

Results: X-ray diffraction shows that the so obtained ND are reasonably pure (97-99% diamond, the rest are other carbon nanostructures)

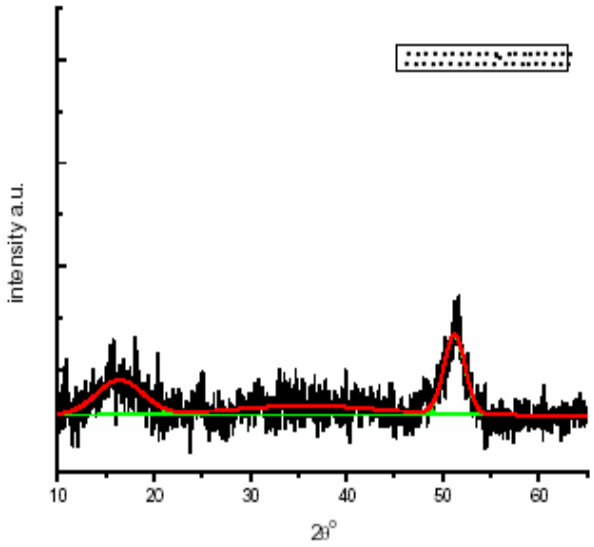


Figure 1. Powder X-Ray Diffraction Analysis of Cylindrical ND

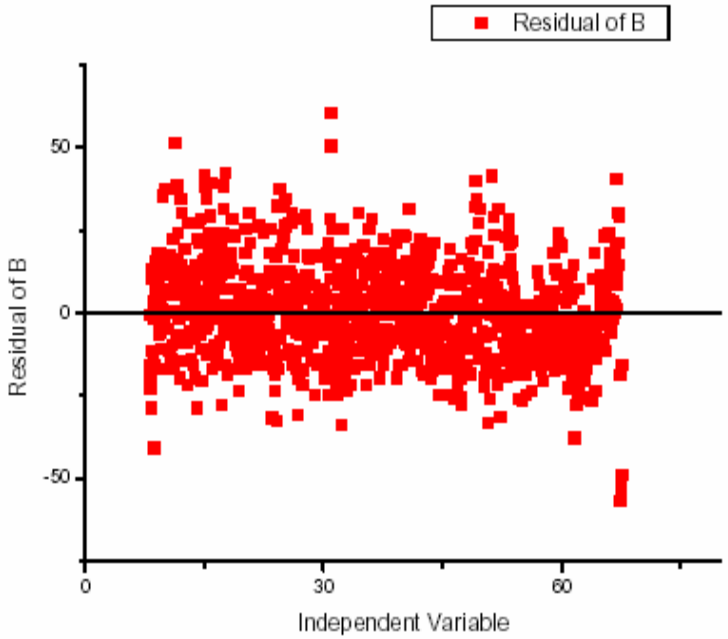


Figure 2. Residual difference plot of experimental and modeled diffractogram of cylindrical ND