### Pd/D Co-Deposition: Excess Power Generation and Its Origin

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## **Particle Detection Using CR-39**

• CR-39, polyallyldiglycol carbonate polymer, is widely used as a solid state nuclear track detector

•When traversing a plastic material, charged particles create along their ionization track a region that is more sensitive to chemical etching than the rest of the bulk

•After treatment with an etching agent, tracks remain as holes or pits and their size and shape can be measured.





## <image>

Features due to background are small, bright and shallow (they refract light from the shallow, curved, bottoms causing them to be brighter when the microscope is focused on the surface features). The deeper nuclear tracks are darker. If you focus deeper into the chip they show bright points of light at their centers.











### Conclusions

- Early Pd/D co-deposition experiments demonstrated excess enthalpy, formation of hot spots, emission of low intensity radiation, and production of tritium
- Excess enthalpy is generated by highly energetic fast reactions that resemble "mini-explosions". This view is supported by IR imaging (hot spots) and by the response of the pressure/temperature sensitive substrates (piezoelectric material) onto which the Pd/D films are co-deposited
- An external electric/magnetic field changes the shape of the individual globules of the "cauliflower" structure of the Pd/D co-deposited material
- New elements are observed that are associated with the morphological features formed by the action of the external E/B fields
- Using CR-39 detectors, tracks are obtained that are consistent with both nuclear charged particles and neutron knock-on tracks