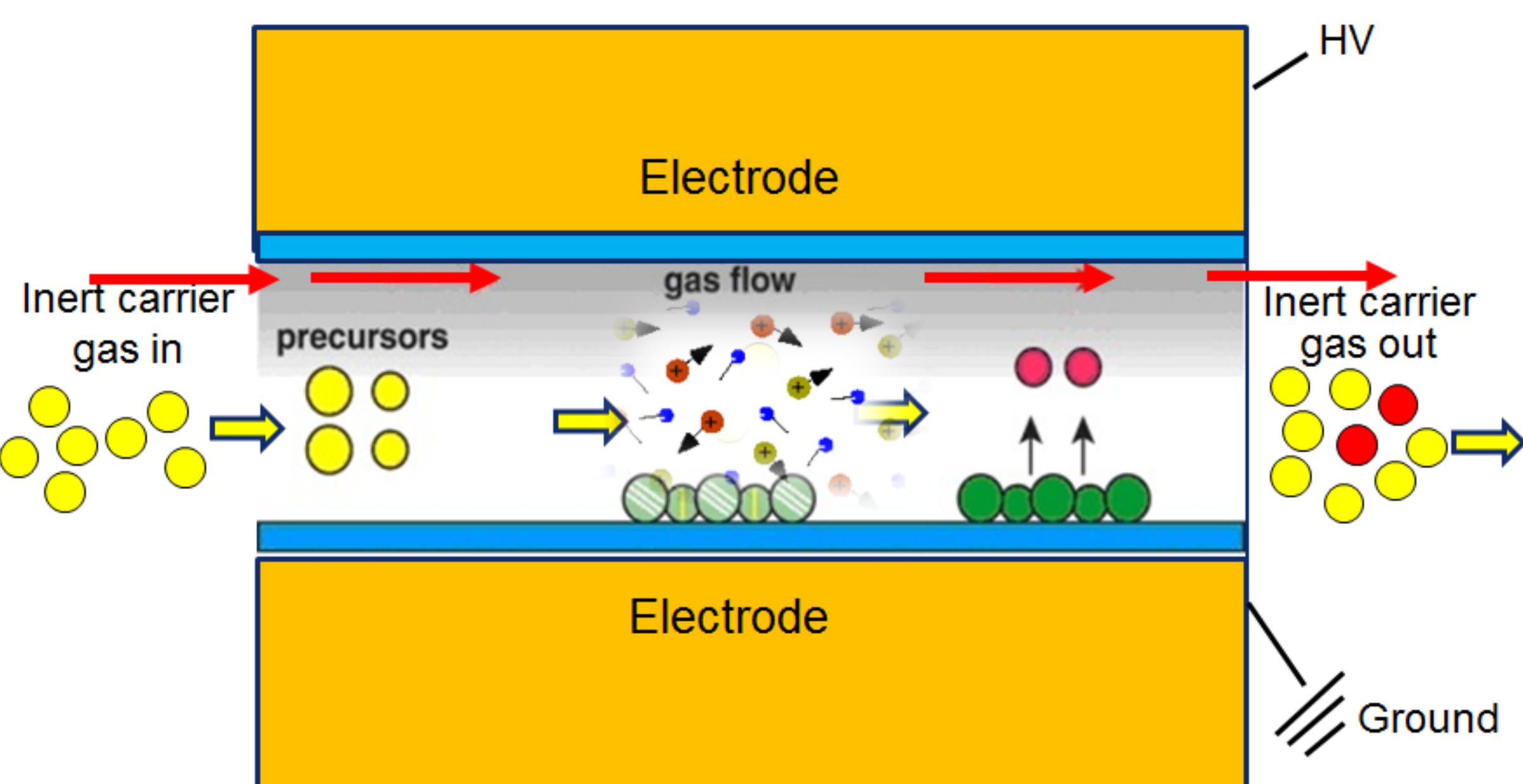


S&T Campaign: Sciences for Lethality and Protection
Kinetic Lethality
Propulsion and Launch

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Research Objective

- Plasma enables new chemical reactions & interactions that are difficult or impossible with conventional methods
- Develop methodologies to produce novel energetic materials using plasma enhanced synthesis and/or surface functionalization
- Optimize experimental conditions for reproducible desired material properties
- Demonstrate enhanced energetic performance and superior structural features through comprehensive material characterizations



Plasma-enhanced Chemical Vapor Deposition in a Dielectric Barrier Discharge (DBD) Configuration

Challenges

- Plasma chemistry and physics are extremely complex science
- Detail reaction/interaction mechanisms are highly system and material dependent
- Fine tuning experimental conditions require advanced understanding of plasma science and simulation/modeling
- Large quantity production requires continuous endeavors on consistent experiments & scale-up

ARL Facilities and Capabilities Available to Support Collaborative Research

- Well-equipped plasma laboratories with multiple plasma chamber enclosures are available at ARL-APG site.
- Multiple DBD reactor configurations and plasma power supplies
- Comprehensive advanced materials characterization instruments for structural and chemical analyses: TEM, SEM, FIB, AFM, XPS, XRD, SAXS, FTIR, LIBS, DSC, GC
- Lab-scale and large scale energetic testing available: LASEM, strand burner tests
- Energetic testing and evaluation



Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- In-situ advanced microscopic characterization facilities/capabilities are needed for dynamic structural characterization of materials.
- Simulation/modeling of chemical vapor deposition process: gas phase, interface, solid phase
- Simulation/modeling of nanoparticle synthesis/functionalization in gaseous/liquid plasmas
- Chemical synthesis/deposition of other novel energetic materials

Recognition

- Chair 2017 MRS Fall Meeting Plasma Symposium PM1