

PROBLEM STATEMENT

1



EXTREME ENVIRONMENTS

-  High Temperatures
-  Heavy Mechanical Stress
-  Corrosive Environments
-  Severe Wear



2

POTENTIAL APPLICATIONS

-  Hypersonic Flight ($\approx 6\times$ Sound speed)
-  Rocket Nozzles & Hot-Section Components



<https://www.livescience.com/technology/engineering/boom-supersonics-next-generation-xb-1-passenger-plane-1-step-away-from-breaking-the-sound-barrier>

★ Promising Candidates: **HIGH-ENTROPY CARBIDES**

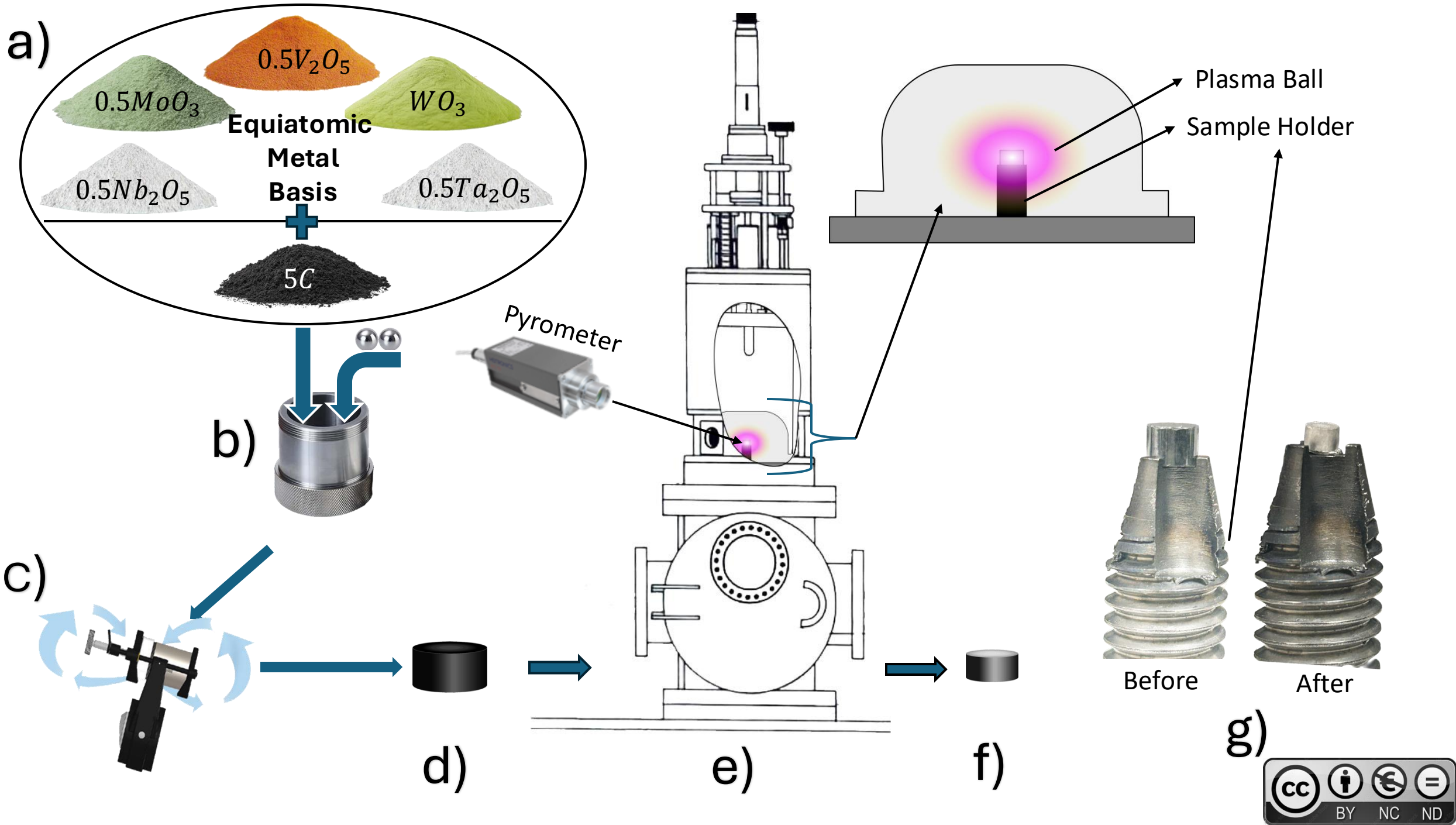
3



4



EFA



MIHP: A NEW SYNTHESIS PROCESS FOR HECs

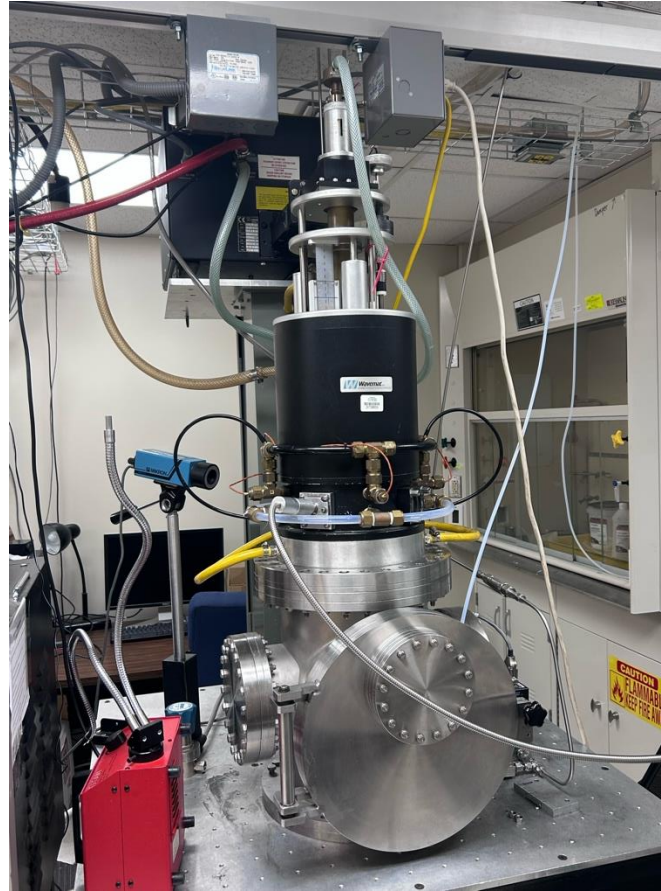


10 – 100 x



Traditional Sintering

Carbothermal Reduction Reaction



1/2 x



Our Approach: MIHP

Hydrogen Reduction Reaction



= 1 kWh



Our Approach: MIHP