

## UMF Equipment - Protochips Atmosphere System

### Environmental Microscopy at Elevated Temperature and Gas Pressure

The Atmosphere system creates an in situ reaction chamber inside TEM microscope, enabling atomic resolution imaging of dynamic nanoscale processes under realistic conditions. It features the ultimate flexibility in gas handling and software-controlled introduction of vapors. The Atmosphere system is bringing you closer than ever before to nanoscale operando experiments.

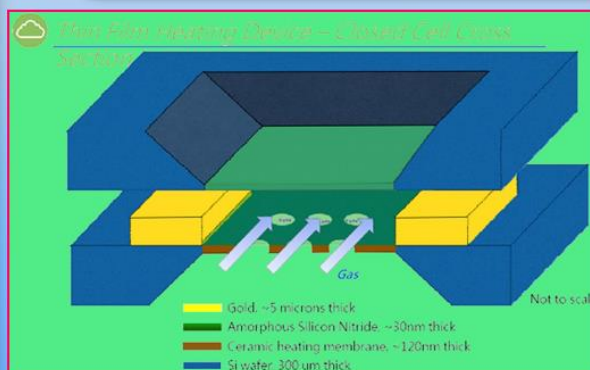
- Features:
- Relevant Conditions:
    - Operating pressure: from 3 to 760 torr ( 1 atm ),
    - Temperature: from room temperature to 1000 °C.
  - Accurate Temperatures Under Gas Condition  $\pm 5\%$  with real time control
  - Heating/cooling rate: up to 5 °C/s
  - High Resolution ( 2.3 Ang ) & EDS Capable
  - Easy to Load & Operate - Full Software Control

Please refer to <https://www.protochips.com/products/atmosphere/> for further details of the system, and contact Dr. Wei Lu ([wei.lu@polyu.edu.hk](mailto:wei.lu@polyu.edu.hk)) for any enquiries on its applications and for arranging for a training.

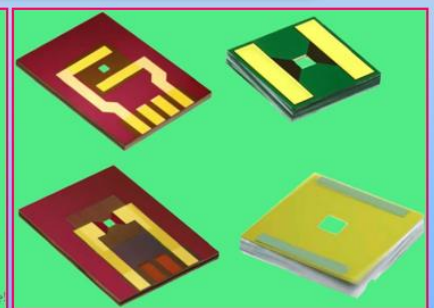
### Components of the Atmosphere System:



Atmosphere 210 System

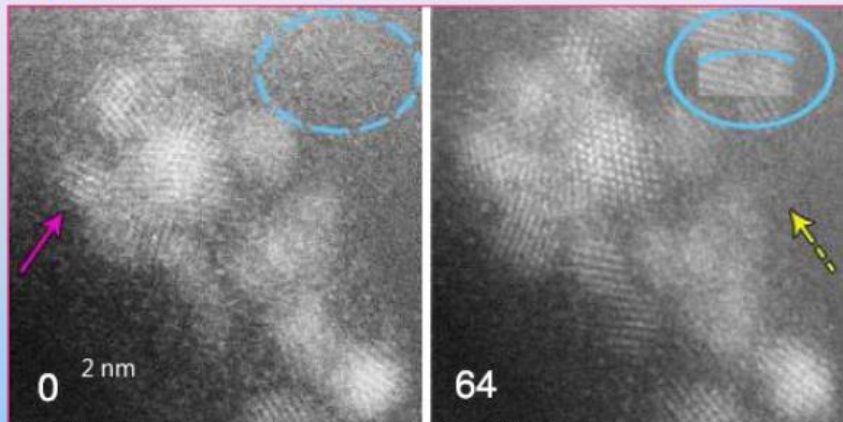


Cross Section Schematic of a Thermal E-chip



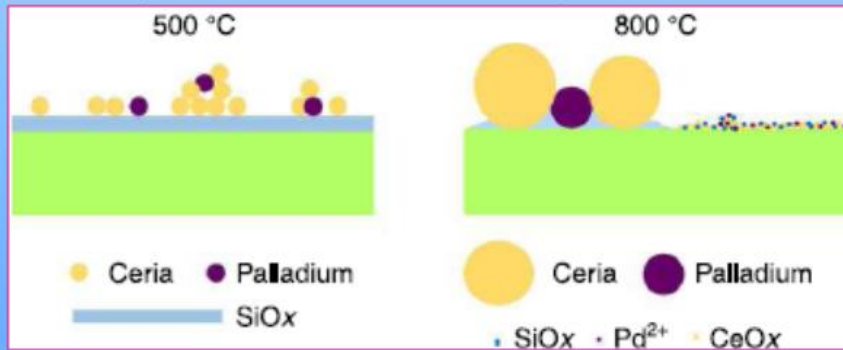
A Pair of E-chip Devices is Required for Closed Cell

## Application:



Initial image  
150 Torr O<sub>2</sub>, 500 °C

After 64 minutes  
150 Torr O<sub>2</sub>, 500 °C



Figures show that the formation of the two distinct structures – larger nanoparticles and highly dispersed atomic-scale clusters – possibly stabilized by silicon. 200 kV JEOL-2100F X. Pan group Nature Comm. 6, pp7778 (2015)