

## Preparation of Catalysts by Ion Soft Landing

**A new method precisely controls catalytic surface composition and particle size by gently depositing mass-selected ions, enabling the preparation of tailored catalytic surfaces.**

Most catalytic surfaces involve metal atoms in certain arrangements, sizes, and compositions that lead to high reactivity. Previous studies have shown that both the size and composition of catalytic particles play large roles in the catalytic activity of such surfaces. Existing methods provide some control over the catalyst surface composition, but offer only limited or no control with respect to the size of the active catalyst material. Unless great care is taken, a wide distribution of sizes is often seen. There is a need for methods and apparatuses that can prepare a surface precisely and accurately with a compound capable of having catalytic activity as an ion.

Researchers at Purdue University have developed a new methodology for preparing catalytic surfaces through molecular soft landing of mass selected ions. The principal advantage of this method is that mass spectrometry allows almost any imaginable combination of atoms in a particular geometrical arrangement to be generated and ion soft landing allows this molecular entity or combination of entities to be selected and then gently deposited onto a surface while remaining intact. Using electrospray ionization, delicate molecular structures or mixtures of structures can be generated and mass selected. Using an ion trap, mass selection of ions can be done prior to landing. The result is a well-controlled selection of the desired catalyst particle size and molecular composition; therefore, catalytic surfaces of known composition can be prepared.

### **Advantages:**

- Can define chemical composition of catalytic surface
- Control of catalyst particle size and molecular composition
- Optimal cluster size and composition

Potential Applications:

### **Technology ID**

64875

### **Category**

Chemicals & Advanced  
Materials/Specialty &  
Performance Chemicals  
Materials Science &  
Nanotechnology/Nanomaterial  
Characterization & Imaging Tools  
Chemicals & Advanced  
Materials/Materials Processing &  
Manufacturing Technologies

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### **View online**



-Chemical analysis

**TRL:** 5

**Intellectual Property:**

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**Keywords:** advanced laser manufacturing solution, simultaneous material properties and dimensions construction, material deposition, variable layer thickness, freeform structures, varying composition, laser heat material removal, laser hardening, substrate annealing, complex internal geometries, Chemistry and Chemical Analysis, Mass Spectrometry, Paper Spray Ionization