LOW VOLTAGE
NUCLEAR TRANSMUTATION
WORK IN PROGRESS
(Completion expected by June 2004 if sponsor is found)
by
KEN SHOULDERS
Bodega, California
PROJECT GOALS

1. TO SHOW NUCLEAR TRANSMUTATION USING EVs OPERATING AT LOW VOLTAGE

2. TO PRESENT DATA IN MASS SPECTROMETRIC FORM

3. TO DEFINE THE TRANSMUTATION PATHWAY

4. TO PROVIDE A VERY LOW-COST MASS SPECTROMETER DESIGN FOR EASY CONSTRUCTION AND OPERATION BY ANYONE HAVING INTERMEDIATE SKILLS
DEMONSTRATION METHOD IN BRIEF

1. A sample of chosen material, such as, aluminum oxide, is placed in a miniature reactor vessel that can be periodically accessed by an ion trap type of mass spectrometer.

2. The material is reacted with EVs generated by a spark process allowing long, EV boring type runs through the material.

3. After a few seconds of reaction time, the material is sampled by the mass spectrometer. This sampling process requires only a fraction of a second and then the sample record is stored for later reference.

4. The reaction is continued for several minutes with periodic sampling to determine accumulated changes occurring in the mass spectrum as indicated by isotope shift.

5. When a comparison with the previous samples shows that isotopes are being shifted or translated, the spectrometer is adjusted to follow chosen peaks more closely.

6. When the reaction is terminated after a few minutes, the operator can open the reactor chamber and remove the newly translated material for further analysis on a different type of instrument.
REACTOR TYPES

METAL “BLACKS”

Metal blacks are “splattered” or sputtered into the volume of the reactor giving a highly interactive path for EVs. These materials are similar to almost all successful cold fusion surfaces or EV targets (see “EVs in Cold Fusion” by Ken Shoulders). Although the EV interaction is initially high, the blacks are soon consolidated into surface films consisting of islands like those shown in the SEM photos below. This resultant film has low EV interaction efficiency and is equivalent to a bulk metal.

POWDER BORING

Various compounds in the reactor, in dispersed form and usually semiconductor compounds or metal oxides, can be bored by EVs with high efficiency (see “Charge Clusters in Action” by Ken Shoulders). These materials are good candidates for nuclear transmutation studies although they give results that are more difficult to interpret than simple metals due to the higher nuclear complexity of the starting material.
BASIC APPARATUS

EV Reactor-Ion Source

Pulse Generator

Ion Trap Mass Spectrometer

HF Generator

Scope
EV REACTOR - ION SOURCE

- Alumina substrates
- Silver coating
- Inserted electrode
- Cavity
- Ion exit aperture
- “Splatter” Ni deposit in reactor cavity
- Spherical pocket in ceramic
- Lapped surface
- 0.1”
“SPLATTER” DEPOSITION SOURCE

- Fixed electrode
- Moving electrode
- Discharge region
- Silicone bladder
- Ceramic rod
- Return spring
- Input air line
CONSOLIDATED NICKEL DEPOSITS IN CAVITY

OPTICAL PHOTOS

SEM PHOTOS

CONSOLIDATED NICKEL DEPOSITS IN CAVITY
SEM AND X-RAY ANALYSIS OF REACTOR EDGE AND CENTER ANALYSIS

PARENT MATERIAL ANALYSIS
SIMS ANALYSIS OF REACTOR FINAL CONTENT BY C.E. EVANS ASSOC.

Reactor Cavity #3
(Nickel in Al$_2$O$_3$)
THE HARD WAY

1. FULL ELECTRONIC CONTROL
2. HYPERBOLIC ION TRAP ELECTRODES MADE OF METAL WITH ADDED INSULATORS
3. USE OF HIGH VACUUM PUMPING
4. SHIELDED EV ION SOURCE
5. COMMERCIAL ELECTRON MULTIPLIER
6. CASH OUTLAY ABOUT $8,000.00
NUCLEAR MASS MODIFICATION AND ANALYSIS USING AN EV GUN AND A QUADRUPOLE ION TRAP MASS SPECTROMETER

SCHEMATIC CUTAWAY OF ION TRAP MASS SPECTROMETER

- PRODUCTION OF NEW ISOTOPES BY EV BOMBARDMENT
- SHAPE ANALYSIS BY USE OF SCANNING ELECTRON MICROSCOPY (SEM)
- ISOTOPE ANALYSIS BY USE OF MASS SPECTROMETER
- MICROSECOND DURATION ISOTOPE LIFETIME MEAS.
- X-RAY AND FAST NEUTRAL PARTICLE MEASUREMENT.
ION TRAP MASS SPECTROMETER

- Ring electrode
- End cap
- Dynode
- Electron multiplier
- Anode
EV ION SOURCE AND ION TRAP
EV REACTOR ION SOURCE DETAILS

- 5 ns Pulse input
- 12 pf energy storage capacitor
- Electrodes & active gap
- Bypass capacitors (400 pf each)
- Bias input
TIME-OF-FLIGHT SPECTRUM OF Ni MULTIPLE SHOTS FROM ION SOURCE

Time of Flight mass spectrum coming from ion source through aperture and into a Faraday cup with negative bias applied to it.
ION TRAP MASS SPECTROMETER

EXPERIMENTAL SETUP FOR ITMS

ITMS Chamber
5 ns pulse gen.
ION TRAP SPECTROMETER CONTROLS

MASS SCAN
- Low Mass
- High Mass
- Mass Band

LOW FREQUENCY RESONANT EJECTION
- LF Level
- LF Center Freq.
- LF Scan Range

MASS SCAN SETUP
- Injection Level
- Injection Time
- Mass Scan Time
- Mass Scan Rate
- Manual Scan
- % DC Inject

EMISSION CONTROL
- Emission Level
- Emission Delay
- Emission Time

GAIN & IONIZATION
- Gain
- Electrons
- EV Voltage

SYSTEM CONTROLS
- Power
- Vacuum
- Cooling Gas
- Gas Pressure
BACK PANEL VIEW OF CONTROL

3 Frequency Driver

Mass Sweep Control

Matching network
SCOPE PHOTOS OF ION TRAP MASS SPECTROMETER CONTROL WAVEFORMS
THE EASY WAY

1. MANUAL CONTROL USING HAM TRANSMITTER HF SOURCE
2. CYLINDRICAL ION TRAP SPECTROMETER MADE OF CERAMIC WITH METAL COATING
3. ROUGH PUMP VACUUM ONLY
4. UNSHIELDED EV ION SOURCE
5. HOMEMADE CERAMIC ELECTRON MULT.
6. CASH OUTLAY ABOUT $1,800.00
EV REACTOR AND CYLINDRICAL ION TRAP MASS SPECTROMETER

2 VIEWS OF CYLINDRICAL ION TRAP MASS SPECT.
2 VIEWS OF CYLINDRICAL ION TRAP MASS SPECTROMETER WITH ELECTRON IONIZER FOR OPERATION WITH GAS
CYLINDRICAL, CERAMIC ION TRAP MASS SPECTROMETER

- Ring electrode
- Spacers
- End cap electrode
- Aperture
- Silver coating
ION TRAP WITH ELECTRON IONIZATION SOURCE INSTALLED IN VACUUM SYSTEM

- Ion trap
- Filament power
- Gas inlet line
- Anode
- Electron multiplier
- Resistor
- Dynode
TEST SETUP USING “HAM” TRANSMITTER

- Vacuum chamber
- “Ham” transmitter
- Gas inlet
- HF output coil in shield box
SCOPE PHOTO OF ARGON SPECTRUM FROM CERAMIC, CYLINDRICAL ION TRAP

Argon peak (40 amu)
Background total pressure about $1 \times 10^{-4}$ torr.
Electron ionization.
Ions not “cooled” in trap with He gas.

Data recorded on Tektronix 7854 Storage Scope

Organic fragments
EV SPARK, TITANIUM ION SOURCE FED INTO CYLINDRICAL TRAP OPERATING IN ROUGH-PUMPED VACUUM

Titanium Isotope Spectrum

Natural Abundance

46 = 8.25%
47 = 7.45%
48 = 73.7%
49 = 5.4%
50 = 5.2%

Data Recorded on Velleman PCS 500 Digital Oscilloscope ($450.00)
WHAT IS THIS MESS!

 Titanium ions from EV source striking exit inside of trap yield a form of SIMS.
 To remove effect: Make exit aperture of trap larger than entry aperture.

Data recorded on Tektronix 7854 Storage Scope

No He gas “cooling”
1. Three overlapping spectra of Titanium isotopes, shot into a target from an EV gun at time intervals of about 1 minute, produce distinctly different patterns due to the different abundance of isotopes on the target.

2. The data is collected as X-Y data using a Velleman PCS 500 digital oscilloscope.

3. The data is then processed by Excel to produce this chart.

4. Differences between the traces can be determined by using the math capability of Excel.
HIGH RESOLUTION ION TRAP SPECTROMETER

(Taken from literature)

Fig. 12. The CsI cluster ion at $m/z$ 3510 showing mass resolution in excess of $10^6$ [18].
CERAMIC ELECTRON MULTIPLIERS

MULTISTAGE Cu-Be MULTIPLIER WITH RESISTORS

Painted-on resistors

Cu-Be dynodes

Ceramic plates

PROPOSED, CAST ELECTRON MULTIPLIER CONFIGURATION
LOW-TECH. CERAMIC SHOP

- Lathe (Very old & very cheap)
- Kiln (Also cheap)
- Casting porcelain (Dirt cheap)
- Hotplate (virtually free)
INEXPENSIVE VACUUM PUMP COMBINATION

Use air pressure output from Gast pump to drive 2” diameter turbine of Siegbahn vacuum pump to about 60,000 rpm.
MAKE AND USE EV REACTOR-SPECTROMETERS BY THE HUNDREDS TO "INUNDATE THE OPPOSITION WITH A MASSIVE ARRAY OF FACTS ON LOW-VOLTAGE TRANS_MUTATION"