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Title: Identification and Forensic Characterization of Nuclear
Materials

Author(s): Marianne Wilkerson

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AWE
15 October 2010



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Identification and Forensic Characterization of Nuclear Materials

**Marianne P. Wilkerson
Carol J. Burns**

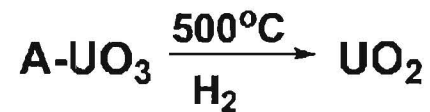
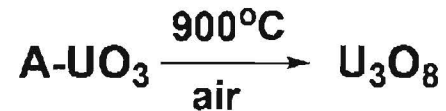
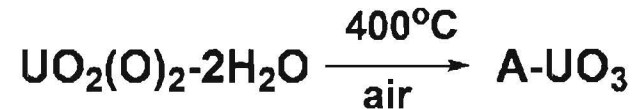
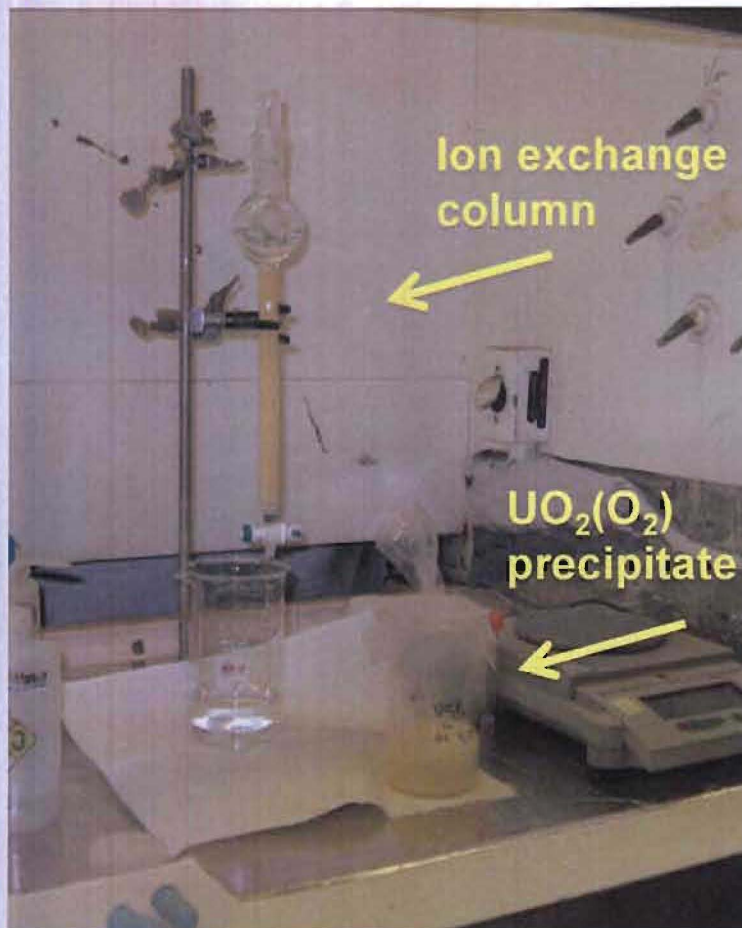
Chemistry – Nuclear and Radiochemistry

15 September 2010

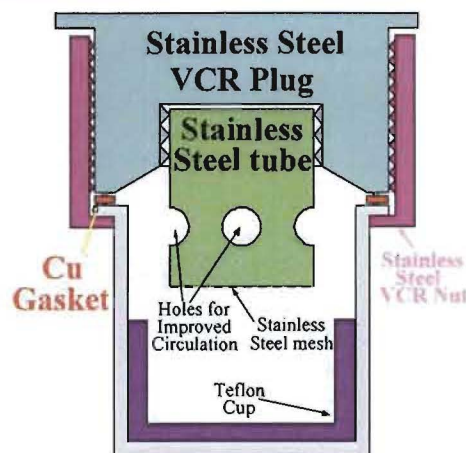
***LANL Laboratory Directed Research and Development – Directed
Research***

***Domestic Nuclear Detection Office – Department of Homeland
Security***

Preparation of uranium oxide materials for controlled aging experiments on bulk samples.



Preparation of uranium oxide materials for controlled aging experiments on bulk samples.



CRC Manual, Constant Humidity Solutions: $RH = A \cdot \exp(B/T)$

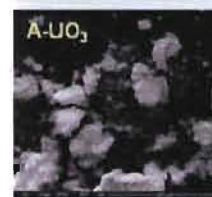
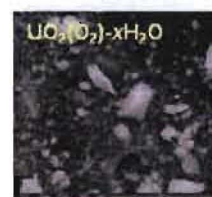
Lithium Iodide: 25% RH at 278.15 K

15% RH at 310.15 K

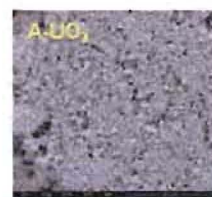
Potassium Nitrate: 97% RH at 278.15 K

89% RH at 310.15 K

~200 X Magnification

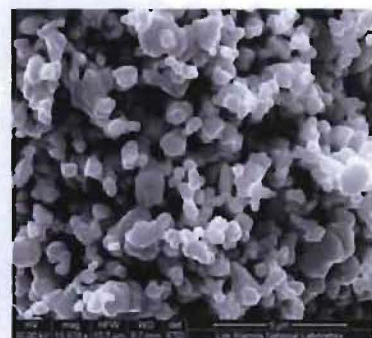
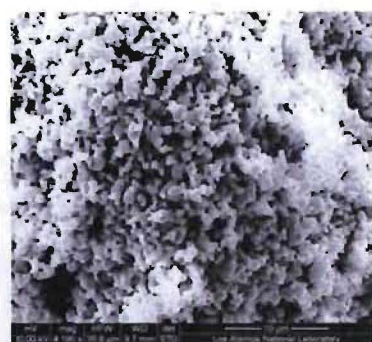


~1,240 X Magnification



~10,000 X Magnification

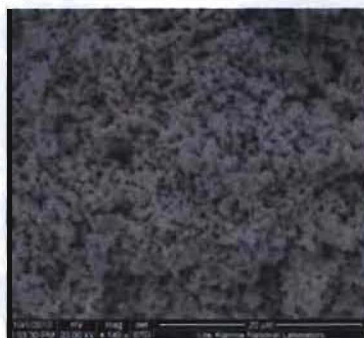




TIME = 0

SAMPLE:
U960 U_3O_8

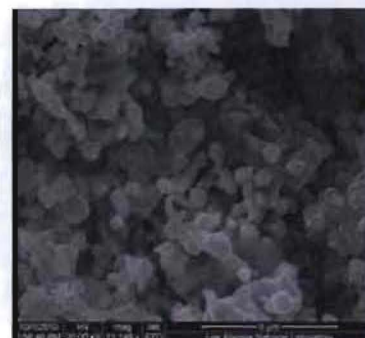
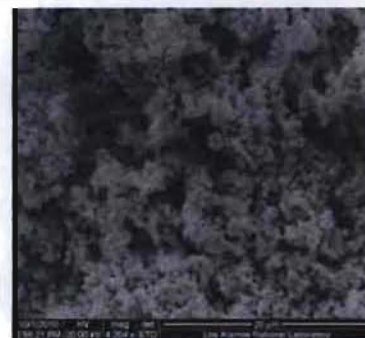
*Aged
3 months*



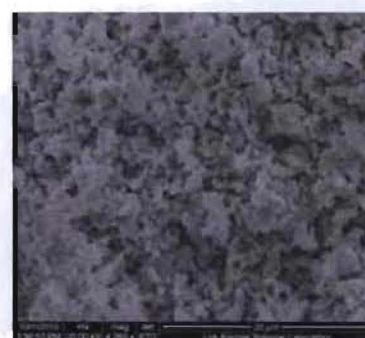
25% REL. HUMIDITY
5°C



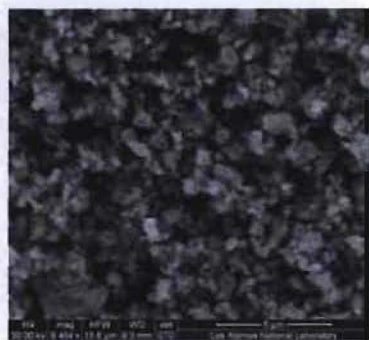
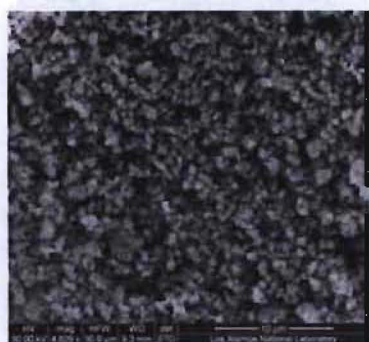
15% REL. HUMIDITY
37°C



97% REL. HUMIDITY
5°C



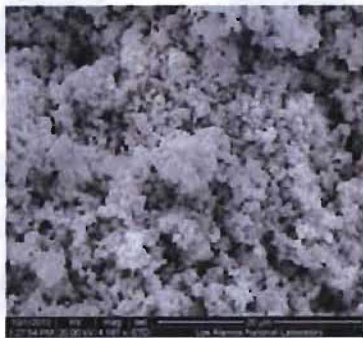
89% REL. HUMIDITY
37°C



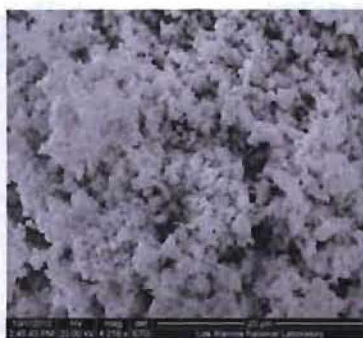
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SAMPLE:
U960 UO_2

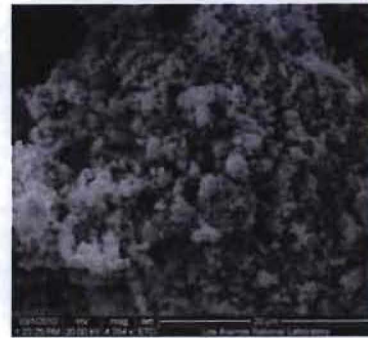
*Aged
3 months*



25% REL. HUMIDITY
5°C



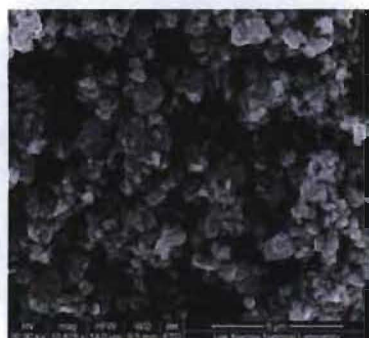
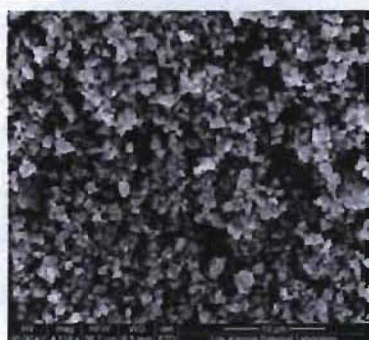
15% REL. HUMIDITY
37°C



97% REL. HUMIDITY
5°C



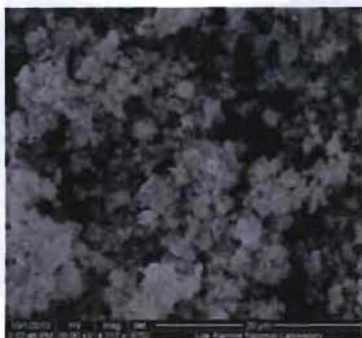
89% REL. HUMIDITY
37°C



TIME = 0

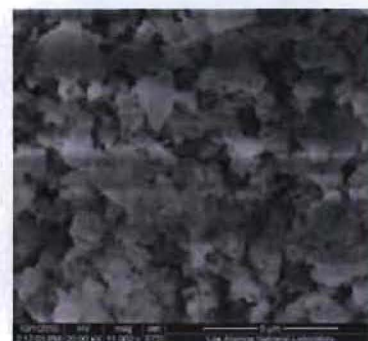
SAMPLE:
U960 UO_3

*Aged
3 months*



25% REL. HUMIDITY
5°C

15% REL. HUMIDITY
37°C



97% REL. HUMIDITY
5°C

89% REL. HUMIDITY
37°C

