particles. This is seen in the narrowing of the elastic and excited state peaks in a plot of momentum versus counts. In the majority of the Hall A experiment, the UO2 and CmO2 were used, as the experiments become more precise. It is necessary to achieve the best possible database in order to study the collision.

**Fingerprint Analysis at the Infrared Beam Line**, JORGE SERVÍN
(West Hills College, Lemoore, CA 93245) MIKE MARTIN (Lawrence Berkeley National Laboratory, Berkeley, CA 94720). Fingerprint Analysis has been around for thousands of years. Samarians were the first that we know of to use fingerprints as a way to sign a contract. Samarians were not the only one's to use fingerprints as a way to do business, in the late 1800 century. Francis Galton used fingerprints in India because the majority of people there were illiterate. The most famous case in the history of fingerprinting occurred in the late 19th century when a man was spotted in the incoming prisoner line at the U.S. Penitentiary in Leavenworth, Kansas by a guard who knew him and had just seen him already in the prison population. Upon examination, the incoming prisoner claimed to be named Will West, while the (not escaped) existing prisoner was named William West. According to their Bertillon Measure- ment they were essentially indistinguishable. As they were not twins, the Bertillon system came into some question. However, their finger- prints were different, and fingerprint identification received a significant boost in credibility. In our research at Lawrence Berkeley National Laboratory this summer, the Intensive Research Group did fingerprint analysis at the Infrared Beam line. Our project consisted of finding out what components were in evidence from fingerprint samples. We used our fingerprints on a gold plated slide. Then, we used the FTIR (Fourier Transformation Infrared Red) Spectrometer to analyze the sample. The machine measures the absorbance of infrared radiation by the sample and records a spectrum. Then we search the computer library or known spectrum types to find a fingerprint match to the suspected types of molecules that are presented in the sample fingerprint. Now the boundaries of infrared forensics are being pushed into uncharted territories by researchers at Berkeley Lab, and the results are promising for criminal and antiterrorism investigations as well as for historians and archaeologists.

**Initial Studies of 235UO2, 238UO2, and 248CmO2 Complexation by Potentiometry and Time Resolved Laser Fluorescence Spectroscopy (TRLFS)**, KRISTINA SVENSSON (College of Marin, Kentfield, CA 94904) HEINO NITSCHKE (Lawrence Berkeley National Laboratory, Berkeley, CA 94720). Understanding the chemical behavior of actinide's aqueous chemistry is necessary for designing cleanup and containment methods, predicting transport rates and preventing further contamination of areas to which actinides have been introduced. The determination of stability constants via potentiometric titrations or TRLFS provides fundamental chemical information which supplemented data used for modeling actinide behavior in the environment. TRLFS was used to analyze micromolar concentrations of UO22+, CmO23+, and CmO24+ complexes with varying carbon chain lengths as well as with phosphoenol pyruvate (PEP) to attain fluorescence lifetime information. The modeling software Hyperquad 2000 aided in the determination of the stability constants of PEP, but additional experimentation is needed. The results show no correlation between carbon chain length and fluorescence intensity. A blue shift is evident from that of free uranyl at pH 3.9 in the presence of 0.05M propionic acid. These shifts are evidence of a second fluorescent species in solution, but further characterization is required for identification. At pH 3, both UO22+ and CmO23+ show a red shift in the presence of 0.045M PEP. These shifts are evidence of a second fluorescent species in solution, but further characterization is required for identification.

**Size and Weight Reduction Through the Use of Depleted Uranium Oxide (DUO), Steel Cermet Materials for Spent Nuclear Fuel Transport and Storage System**, PAUL SWANEE (North Carolina State University, Raleigh, NC 27607) M. JONATHAN HAIRE (Oak Ridge National Laboratory, Oak Ridge, TN 37831). Currently, the US Department of Energy (DOE) is seeking a means to ship 300 MT of depleted uranium oxide (DUO) as a result of enrichment processes. The cost of disposing of this material has been estimated from $240 million to 1.5 billion. Finding a practical use for depleted uranium would save hundreds of millions if not billions of dollars. One possibility is using depleted uranium to make depleted uranium dioxide-steel ceramic storage casks for spent fuel. Previous studies have been performed using the Sm-248 as a tracer in the SCALE4.4a code developed at Oak Ridge National Laboratory. The spent nuclear fuel radiation source term was obtained from Origen-ARP in the SCALE4.4a code package. The gamma shielding efficiency of the cermet material is compared to Holtec International’s HI-STAR 100 cask system that uses conventional steel for radiation shielding. The HI-STAR 100 cask was modeled using information obtained from Holtec’s Final Safety Analysis Report (FSAR). After modeling the HI-STAR 100 cask, the steel layers of the cask were replaced with a layer of cermet material. The thickness of the cermet shielding was adjusted to give the same radiation dose as the HI-STAR cask. The objective of this work is to reduce cask weight and size by using the cermet material to replace conventional steel. If no credit is taken for cermet mecha-nical properties during licensing, calculations show the cask weight reduced by 13.7% and the overall diameter of the cask reduced by 4.8%. However, if the cermet can be relied upon for structural strength and when depleted uranium is used in the cask material, then the effectiveness of the cermet is better utilized. When the cermet ma-terial is fully utilized the cask weight can be reduced up to 17.6% with a reduction in the cask diameter of 6.3%. A small study was performed to see if the characteristics of a cask using an added B4C neutron absorber. When this neutron absorber is embedded in the cermet, the cask diameter is reduced by over 10%. Smaller cask size will facilitate handling during SNF loading operations. If the cask size and weight become small enough, the cask can be put directly into the SNF storage pool for loading for transport, thereby eliminating the need for a separate pool transfer cask.

**A Superabsorbing Hydrogel for Radiological Dispersal Device (“Dirty Bomb”) Cleanup**, NADIA VASQUEZ (Richard J. Daley College, Chicago, IL 60652) MICHAEL KAMINSKI (Argonne National Laboratory, Argonne, IL 60439). Radiological decontamination technologies are needed for non-destructive removal of radioactivity from porous surfaces such as concrete and marble. We are configuring a novel pro-cess chain with post-restoration of the hydrogel for excitation of fingerprint surfaces and further washing of the collected指纹. TRLFS was used to analyze micromolar concentrations of varying carbon chain lengths as well as with phosphoenol pyruvate (PEP) to attain fluorescence lifetime information. The modeling software Hyperquad 2000 aided in the determination of the stability constants of PEP, but additional experimentation is needed. The results show no correlation between carbon chain length and fluorescence intensity. A blue shift is evident from that of free uranyl at pH 3.9 in the presence of 0.05M propionic acid. These shifts are evidence of a second fluorescent species in solution, but further characterization is required for identification. At pH 3, both UO22+ and CmO23+ show a red shift in the presence of 0.045M PEP. These shifts are evidence of a second fluorescent species in solution, but further characterization is required for identification. At pH 3, both UO22+ and CmO23+ show a red shift in the presence of 0.045M PEP. These shifts are evidence of a second fluorescent species in solution, but further characterization is required for identification.

**Nitrogen Solubility in Water**, WENDY WAGSTER (Texas A&M University-Kingsville, Kingsville, TX 78363) GRAYDON YODER (Oak Ridge National Laboratory, Oak Ridge, TN 37831). Integral reactor concepts for a spent nuclear fuel reprocessing facility use a wet process to separate fuel materials in the event of a terrorist attack. The optimized process would involve three steps: (1) remove surface bound species and penetrate the pore structure to free radionuclide ions from the surface and into the pore water; (2) pull water from the pore structure with a superabsorbing hydrogel, and; (3) remove nitrate from the radioactively contaminated water. This tells us the decon-tamination properties in designing an optimal polymer gel formulation. We report performance parameters of polymer candidates for aqueous solution absorbency with a gravimetric analysis of swelling capacity of gel formulations (“tea bag test”). We found the polymer water absorbency is dependent on the effect of ions or chelators in the following wash solutions: NH4Cl, CaCl2, and deionized H2O. We observed increased absorption capacity using smaller grain sized polymer than commercially distributed polymer. The resulting superabsorbent retention capacity calculations suggest that the critical absorption time of polymer formulations is within ten minutes of immersion. The absorbency of polymer candidates is affected by cross-linked and linear formulation ratios. Furthermore, double immersion did not affect subsequent retention of the polymer.

**Superabsorbing Hydrogel for Radiological Dispersal Device (“Dirty Bomb”) Cleanup**, NADIA VASQUEZ (Richard J. Daley College, Chicago, IL 60652) MICHAEL KAMINSKI (Argonne National Laboratory, Argonne, IL 60439). Radiological decontamination technologies are needed for non-destructive removal of radioactivity from porous surfaces such as concrete and marble. We are configuring a novel pro-cess chain with post-restoration of the hydrogel for excitation of fingerprint surfaces and further washing of the collected fingerprints. TRLFS was used to analyze micromolar concentrations of varying carbon chain lengths as well as with phosphoenol pyruvate (PEP) to attain fluorescence lifetime information. The modeling software Hyperquad 2000 aided in the determination of the stability constants of PEP, but additional experimentation is needed. The results show no correlation between carbon chain length and fluorescence intensity. A blue shift is evident from that of free uranyl at pH 3.9 in the presence of 0.05M propionic acid. These shifts are evidence of a second fluorescent species in solution, but further characterization is required for identification. At pH 3, both UO22+ and CmO23+ show a red shift in the presence of 0.045M PEP. These shifts are evidence of a second fluorescent species in solution, but further characterization is required for identification. At pH 3, both UO22+ and CmO23+ show a red shift in the presence of 0.045M PEP. These shifts are evidence of a second fluorescent species in solution, but further characterization is required for identification. At pH 3, both UO22+ and CmO23+ show a red shift in the presence of 0.045M PEP. These shifts are evidence of a second fluorescent species in solution, but further characterization is required for identification.