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Educational efforts, research activities and opportunities in Nuclear Materials Chemistry at UC Irvine

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Recent research activities at the University of California, Irvine (UCI) have focused on advancing scientific understanding in the context of nuclear waste management context. This presentation highlights interconnected research thrusts addressing performance, durability, advanced processing of nuclear materials, and education in nuclear materials science.

Insights into the hydrothermal corrosion behavior of UO_2 in contact with cladding and waste canister materials will be discussed. Emphasis is placed on interfacial reactions, and secondary phase formation to contribute to a mechanistic understanding of fuel/cladding/container interactions during extended storage in a deep geological repository. Moreover, highlights of tailored ceramics waste forms, i.e. pyrochlores, will be presented. Particular focus is given to compositional flexibility, radiation tolerance, and long-term structural stability, demonstrating the capacity of pyrochlores to incorporate actinides and fission products, while maintaining chemical durability. In addition to waste management efforts, examples of the application of the sol–gel technique to synthesize nuclear materials with controlled composition, microstructure, and morphology will be shared.

Finally, research advances, and educational efforts in nuclear materials science at UCI will be highlighted, including hands-on laboratory training opportunities, and student involvement in cutting-edge research, aimed at preparing the next generation of nuclear materials scientists.