

Ashini Jayasinghe

Chemistry and Biochemistry

Exploring Stable Forms for Radioactive Waste
Storage

The Office of Postdoctoral Affairs

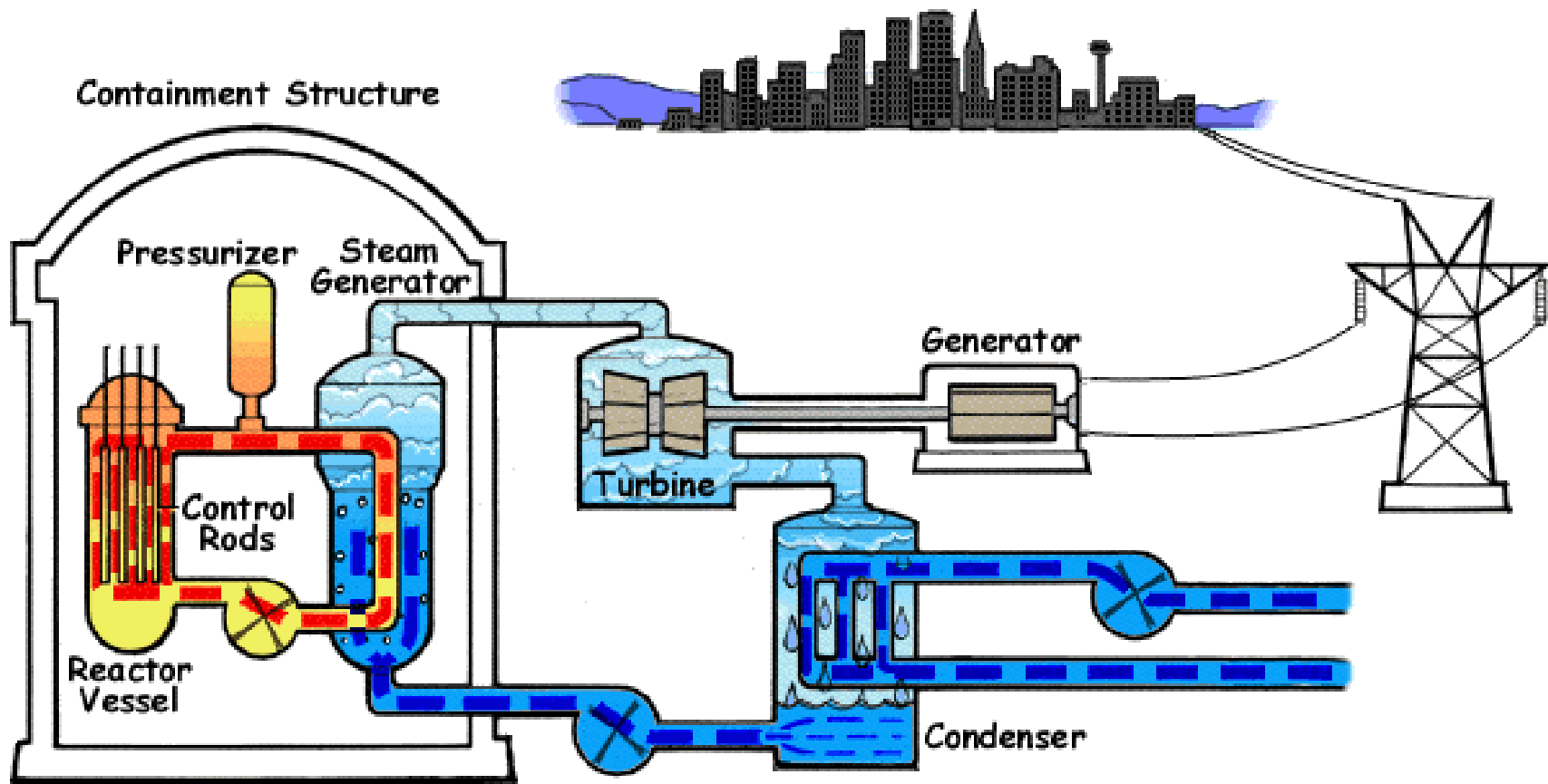
The Graduate School | Florida State University

Nuclear energy is one of the leading methods used to generate electricity

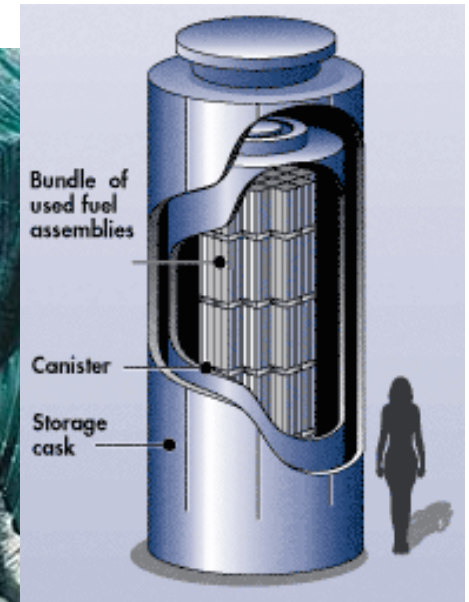
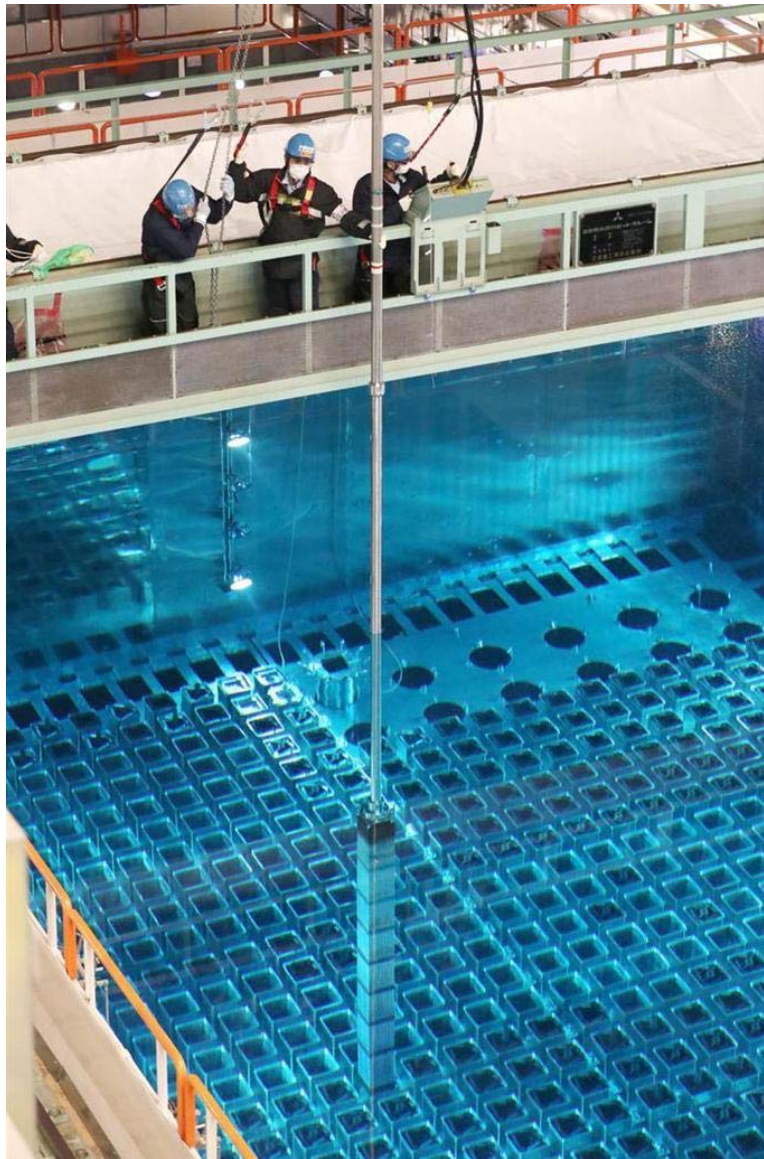


Uranium is the main source used in nuclear fuel

The energy released from atoms breaking is used to generate electricity



The main issue of nuclear energy is waste management



I am trying to synthesize uranium silicide materials

H Hydrogen 1 Sun and Stars																	He Helium 2 Balloons										
Li Lithium 3 Batteries	Be Beryllium 4 Emeralds	<div style="border: 2px solid blue; border-radius: 20px; padding: 5px;"> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>Fe Iron 26 Steel Structures</td> <td>Co Cobalt 27 Magnets</td> <td>Ni Nickel 28 Coins</td> <td>Cu Copper 29 Electric Wires</td> </tr> </table> </div>								Fe Iron 26 Steel Structures	Co Cobalt 27 Magnets	Ni Nickel 28 Coins	Cu Copper 29 Electric Wires	B Boron 5 Sports Equipment	C Carbon 6 Basis of Life's Molecules	N Nitrogen 7 Protein	O Oxygen 8 Flame	F Fluorine 9 Toothpaste	Ne Neon 10 Neon Signs								
Fe Iron 26 Steel Structures	Co Cobalt 27 Magnets	Ni Nickel 28 Coins	Cu Copper 29 Electric Wires																								
Na Sodium 11 Salt	Mg Magnesium 12 Chlorophyll									Al Aluminum 13 Airplanes	Si Silicon 14 Stone, Sand, and Soil	P Phosphorus 15 Fertilizer	S Sulfur 16 Gunpowder														
K Potassium 19 Fruits and Vegetables	Ca Calcium 20 Shells and Bones	Sc Scandium 21 Bicycles	Ti Titanium 22 Aerospace	V Vanadium 23 Springs	Cr Chromium 24 Stainless Steel	Mn Manganese 25 Earthmovers	Fe Iron 26 Steel Structures	Co Cobalt 27 Magnets	Ni Nickel 28 Coins	Cu Copper 29 Electric Wires	Zn Zinc 30 Brass Instruments	Ga Gallium 31 Light-Emitting Diodes (LEDs)	Ge Germanium 32 Semiconductor Electronics	As Arsenic 33 Poison	Se Selenium 34 Copiers	Br Bromine 35 Photography	Kr Krypton 36 Flashlights										
Rb Rubidium 37 Global Navigation	Sr Strontium 38 Fireworks	Y Yttrium 39 Chemical Reactions	Zr Zirconium 40 Mag Lev Trains	Nb Niobium 41 Mag Lev Trains	Mo Molybdenum 42 Cutting Tools	Tc Technetium 43 Radioactive Diagnostics	Ru Ruthenium 44 Radioactive Diagnostics	Rh Rhodium 45 Catalytic Converters	Pd Palladium 46 Catalytic Converters	Ag Silver 47 Jewelry	Cd Cadmium 48 Batteries	In Indium 49 Solder	Sn Tin 50 Plated Food Cans	Sb Antimony 51 Car Batteries	Te Tellurium 52 Thermoelectric Coolers	I Iodine 53 Disinfectant	Xe Xenon 54 High-Intensity Lamps										
Cs Cesium 55 Global Navigation	Ba Barium 56 X-ray	La Lanthanum 57 Telescope Lenses	Ce Cerium 58 Lighter Flints	Pr Praseodymium 59 Torchworkers' Goggles	Nd Neodymium 60 Electric Motor Magnets	Pm Promethium 61 Luminous Dials	Sm Samarium 62 Electric Motor Magnets	Eu Europium 63 Color Televisions	Gd Gadolinium 64 MRI Diagnosis	Tb Terbium 65 Fluorescent Lamps	Dy Dysprosium 66 Smart Material Actuators	Ho Holmium 67 Laser Surgery	Er Erbium 68 Optical Fiber Communications	Tm Thulium 69 Laser Surgery	Yb Ytterbium 70 Scientific Fiber Lasers	Lu Lutetium 71 Photodynamic Medicine											
Fr Francium 87 Radioactive	Ra Radium 88 Radioactive	Ac Actinium 89 Radioactive Medicine	Th Thorium 90 Gas Lamp Mantles	Pa Protactinium 91 Radioactive Waste	U Uranium 92 Nuclear Power	Np Neptunium 93 Radioactive Waste	Pu Plutonium 94 Nuclear Weapons	Am Americium 95 Smoke Detectors	Cm Curium 96 Mineral Analyzers	Bk Berkelium 97 Radioactive Waste	Cf Californium 98 Mineral Analyzers	Es Einsteinium 99 Radioactive	Fm Fermium 100 Radioactive	Md Mendelevium 101 Radioactive	No Nobelium 102 Radioactive	Lr Lawrencium 103 Radioactive											

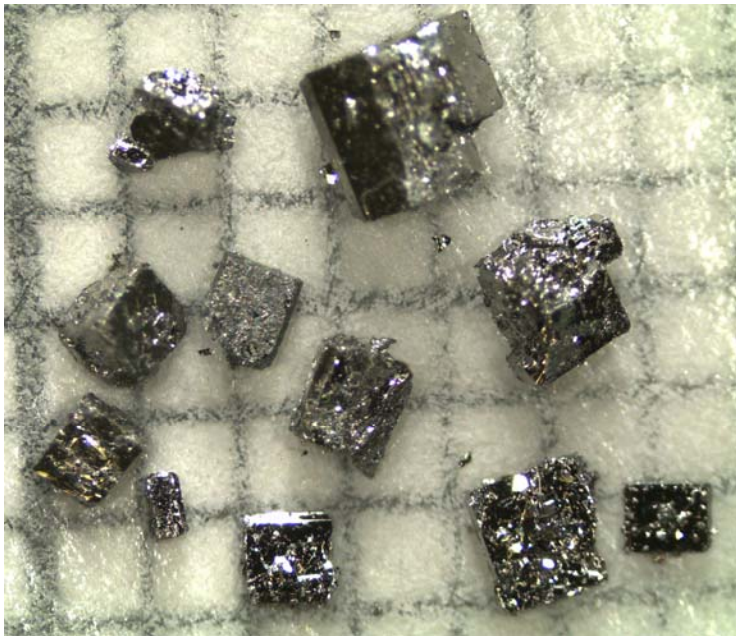
Novel uranium silicide crystals were created and currently studying the stability



U/Ni/Al/Si/Ga



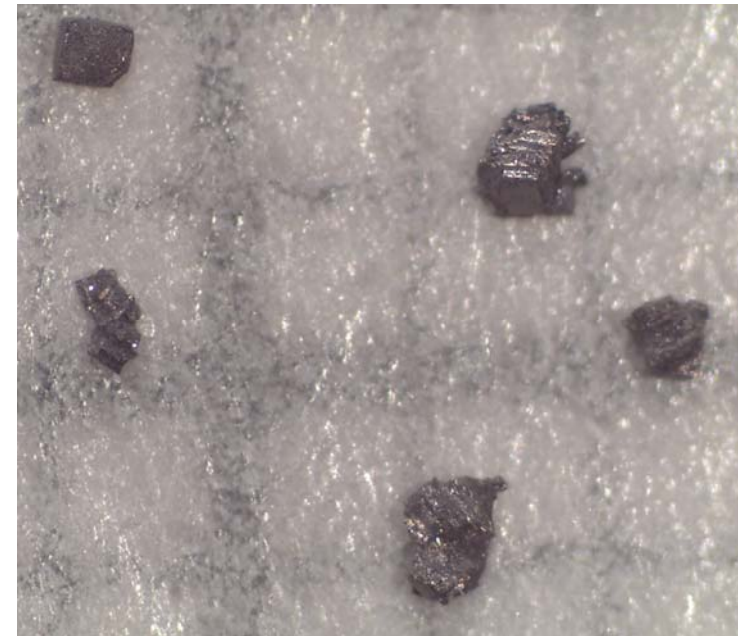
U/Co/Al/Si/Ga



U/Al/Ga/Si



U/Ni/Si



U/Ni/Si

Summary



As a low carbon emitting energy source nuclear energy is necessary

But nuclear waste is a critical issue



Uranium silicide crystals are synthesized and analyzed to find a stable form for waste storage

Thank you!