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Liquid Fuel Fast Reactors and the Future of Nuclear Power

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To mitigate climate change; the world energy use must achieve carbon neutrality by 2050. To achieve this goal, it is now realized that nuclear power must be a major component of the world energy system by 2030. Current nuclear reactors GIII (Generation III) are thermal reactors that use solid Uranium Fuel and cooled by water. They consume 235 U which is less that 1% of natural Uranium. In many aspects those reactors are far superior to other energy sources like the entire range of fossil fuels and all renewable ones. Among other issues they don't produce any greenhouse gases during operation. However, they also suffer from serious problems, for example, very high initial cost, long construction times, very inefficient operation, very large amounts of long-life waste, susceptible to serious accidents like core melt down, costly enriched fuel, etc. Unfortunately, current generations of nuclear reactors don't fit the bill of climate change mitigation scheme. We have designed a fast, liquid fuel, liquid coolant reactor, that alleviates or eliminates altogether most if not all the problems plagued GIII reactors. This design is similar, but drastically different, from the Molten Salt Nuclear Experiment that was carried out in the 1960s at the Oak Ridge National Laboratory in US and successfully proved the viability of the liquid fuel model.
In this talk the principles and some design details of this reactor, the engineering and regulatory challenges will be explained. The superiority of the design relative to GIII reactors, Fossil Fuels and Renewables will be explored as well.

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