

### 4.9.1 Generation IV thermal reactors

Three Generation IV thermal reactors have received substantial attention:

- The design known as the VHTR or very high temperature reactor uses either helium or molten salt as the coolant and graphite as the moderator. Coolant temperatures at the outlet from the reactor as high as  $1000^{\circ}\text{C}$  are visualized in order to achieve high thermal efficiencies (hence the helium or molten salt coolant) and to allow various direct applications such as hydrogen production. Several reactor core designs have been investigated including a prismatic block design and a pebble bed reactor design.
- The design known as the MSR or molten salt reactor is a reactor concept in which the nuclear fuel is dissolved in the molten fluoride salt coolant as uranium tetrafluoride ( $UF_4$ ) or thorium tetrafluoride ( $ThF_4$ ). The fluid would then reach criticality by flowing into a graphite moderator core. The principle could be used for thermal, epithermal or fast reactors.
- The design known as the SCWR or supercritical-water-cooled reactor is an epithermal reactor that uses supercritical water at higher pressures and temperatures as the coolant in order to achieve higher thermal efficiencies. It is basically an advanced LWR.