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## Light water reactor employing fully ceramic micro-encapsulated fuel

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Resumo:

Fully ceramic microencapsulated (FCM) fuel has become a potent candidate for accident-tolerant fuel (ATF). FCM fuel comprises tri-structural isotropic (TRISO) ceramic fuel particles randomly dispersed in a silicon carbide (SiC) matrix. FCM pellets extend to five-year refueling. Therefore, FCM fuel is heterogeneous structurally, and fuel assembly requires around 20% enrichment for 17x17 designs. Also, the outer rod diameter increases and changes the pitch parameter. Kernel of TRISO fuel contains fissile materials covered by a porous carbon buffer layer. The buffer layer shows good retention of fission products, permitting long burn cycles. Options for FCM fuel kernel materials include uranium mononitride (UN) or uranium oxycarbide (UCO). Meanwhile, the kernel manufactured by UN offers a higher heavy metal (HM) loading density than UCO. The power unit design using FCM fuel with TRISO particles dispersed shows lower temperatures encased in a cladding material such as zircaloy, ferritic alloys, or Stell.