Chapter 11
Fuel Chemistry

One key question is what is in the atmosphere above the fuel pellet that could interact with the cladding ?

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11.2 Phase Diagrams of UO_2 and PuO_2

Figures [Columnar (1800-2000 °C),
Equiaxed (1600 °C),
As Fabricated (1000 °C)]

Phase UO_2-->U_4O_9--->U_5O_{13}-->U_3O_8->UO_3

O/U 2.00 2.25 2.6 2.67 3.00

Valence +4 ---------- >+6

From UO_2 Phase Diagram

at T< 1300- 1800 °C
and O/U < 2.00

Then at low temperatures, UO_2 is a mixture of $UO_{2.00}$ +U (met)

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From PuO_2 Phase Diagram;

Phase	**Pu_2O_3**	**$PuO_{1.52}$**	**$PuO_{1.61}$**	**PuO_2**
O/M	**1.5**	**1.52**	**1.61**	**2.00**
Valence	**+3**	**----------**	**----------**	**> +4**