

Reaction Dynamics at Interfaces in DEMO Divertor Systems and Irradiation Effects (FRONTIER Project)

No single material can fulfil all requirements for plasma-facing components (PFCs). Hence, there are variety of types of interfaces in PFCs: interfaces between dissimilar materials, those between plasma and materials, etc..

plasma/gas-solid

solid-solid (dissimilar materials)

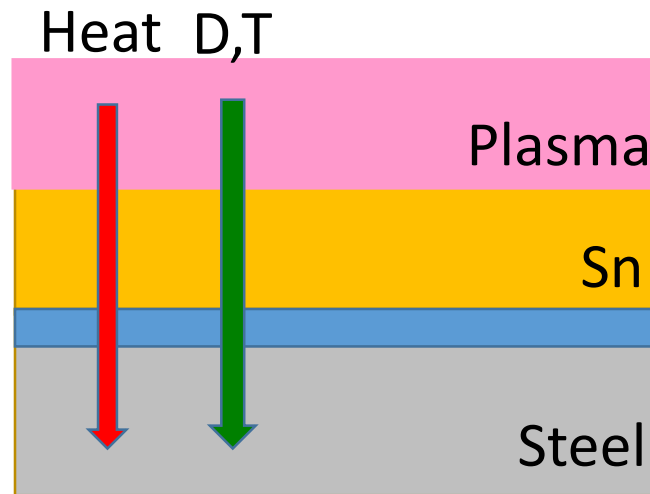
liquid-solid

plasma/gas-liquid (not involved in the project because of negligible influence of neutron irradiation).

In PHENIX project, neutron irradiation effects on bulk properties of W, such as thermal diffusivity, mechanical properties, hydrogen isotope retention etc., were examined. The post-PHENIX project focus its attention on interface phenomena.

Liquid PFC

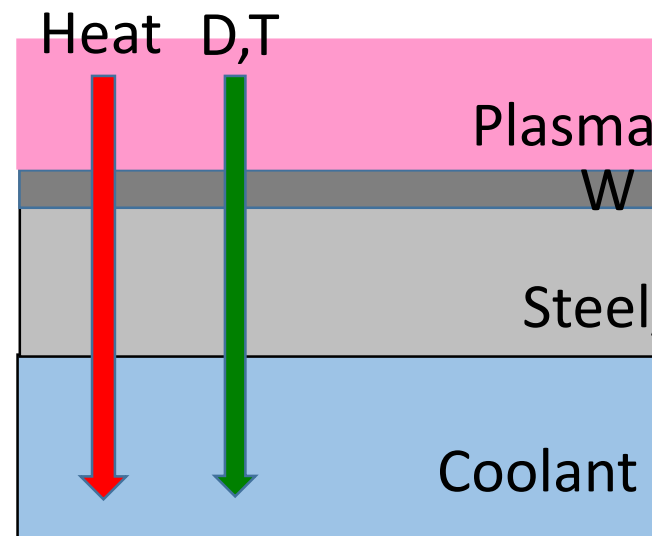
Corrosion,
Robustness
of coating,
Irradiation
effects



Protection Coating

Solid PFC

Interface mod. due
to n-irradiation,
Surface mod. by
plasma exposure,
T transport



Steel/Cu alloy

Reaction Dynamics at Interfaces in DEMO Divertor Systems and Irradiation Effects (Tentative)

Task	Japanese Responsible Person	Research Items	US Institute & POC
Task 1 (solid-solid)	T. Hinoki (Kyoto U.) N. Hashimoto (Hokkaido U.)	Reaction dynamics at solid-solid interfaces under neutron irradiation	L. Garrison X. Hu W. Geringer (ORNL)
Task 2 (plasma/gas-solid, solid-solid)	Y. Oya (Shizuoka U.) T. Otsuka (Kindai U.)	Tritium transport across interfaces, Reaction dynamics under accidental conditions	M. Shimada (INL) D. Buchenauer (SNL/CA)
Task 3 (liquid-solid)	M. Kondo (Tokyo Inst. Tech.) J. Miyazawa (NIFS)	Reaction dynamics between solid material-liquid metal interfaces for liquid divertor systems (Sn, Sn-Li, Li, Li-Pb)	B. Pint (ORNL)
Task 4 (system)	T. Yokomine (Kyoto U.)	Evaluation of feasibility and robustness of solid- and liquid-divertor systems	C. Kessel

Structure

	Japan	USA
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Common task	Takehiko Yokomine (Kyoto U.)	Chuck Kessel (PPPL)

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