

Wall Probes: Diagnostic methods and tools in studies of erosion - deposition processes in controlled fusion devices

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Under terrestrial conditions fusion plasmas must be surrounded by walls of a vacuum vessel and confined by strong external forces such as high power beams or by magnetic fields. Energy stored in a magnetically confined plasma and the enormous temperature gradients between the plasma and the wall pose very stringent requirements regarding both plasma edge shaping and selection of the most appropriate fusion reactor materials. The wall is irradiated by high fluxes of charged particles (electrons, ions), charge exchange neutrals, photons and neutrons. As a consequence, wall materials are eroded and the fusion plasma becomes contaminated by those species removed from the wall. The aim of this lecture is to give an overview of methods and dedicated tools used in diagnosis of wall erosion and material migration.

1. A brief introduction to plasma-wall interactions and consequences of such interactions:
 - *material erosion-migration-deposition*
 - *fuel inventory*
 - *some words about dust generation.*
2. How to study material erosion and migration?
 - Tracer techniques
 - Wall probes, active and passive, and their applications
 - *types: marker tiles and collectors probes*
 - *installation, location in a machine, operation*
 - Thermocouples
3. Analysis of the short- and long-term probes
 - Ion beam techniques
 - Family of microscopy methods
4. Integrated material erosion pattern