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Joint ICTP-IAEA Workshop on Physics of Radiation Effect and its Simulation for Non-Metallic Condensed Matter | (smr 2359)

Wednesday 22 August 2012

R&D and qualification of non-metallic materials for DEMO reactor (long term operation conditions) - Adriatico Guest House Giambiagi Lecture Hall (10:30-11:30)

Non – metallic materials will be needed in radiation-hard components for diagnostic, H&CD, and other systems on DEMO and Power Plants. Up to now, there is enough information to allow one to make recommendations for insulator applications not only in ITER, but also to identify potential problem areas for future fusion devices. For thermo – mechanical properties (strength, swelling, thermal conductivity) data is available for doses > 1 dpa, however in general for the important physical properties which degrade at far lower doses, data is only available for doses << 1 dpa, corresponding to ITER expectations.
In the case of ITER the maximum expected total dose for the numerous insulating components will be at most 0.3 dpa, and < 10 GGy (? 1/10th first wall dose), with the magnetic diagnostics suffering the highest radiation level. From the anticipated increases in the first wall total displacement damage for DEMO and Power Plant (< 3 dpa for ITER, ? 80 for DEMO, ? 150 for Power Plant), and assuming a Tokamak type device, this would lead to total doses for the most exposed insulators of about 8 dpa, 250 GGy (DEMO) and at least 15 dpa, 470 GGy (PP). From all the available data these elevated radiation doses would degrade even the mechanical properties (strength, swelling) of the most radiation resistant refractory oxides to very high levels, as well as introducing large concentrations of transmutation impurities.

time	title	presenter
10:30	R&D and qualification of non-metallic materials for DEMO reactor (long term operation conditions)	SHEILA GONZALEZ