

Abstract Submitted
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Tokamak fusion kidnapped by PSI¹ LEONID ZAKHAROV, LiWFiusion, P.O. Box 2391 Princeton NJ 08543 — Plasma surface interaction (PSI) was always an important part of magnetic fusion. After lack of success with $Q_{DT} = 1$ on TFTR and JET in the 1990s, the role of PSI was dramatically enhanced. The tungsten divertor, with a non-sense requirement of cooling plasma down to 20 eV, became dominant in the research. In fact, the crazy sounding question “Does tokamak fusion need PSI?”, has a definite answer: It does not. During last 2 decades PSI suggested nothing useful for progress but made tokamak hostage. The failure of 1990s was in insufficient energy confinement. The fusion relevant confinement requires high edge plasma temperature, which makes PSI inapplicable. The mean free path L of plasma particles is $L_m \simeq 100 \cdot T_{keV}^2 / n_{20}$. With $n_{20} \simeq 0.1$ and $T_{keV} = 1$, L is already 1 km and is 4 km for 2 keV. The Scrape Off Layer becomes collisionless. Above 1 keV, SoL is not the PSI. It is a flux of independent particles in a self-established electric potential (which is much lower than 3-5 T_e of PSI) with predictable and simple physics unlike the mess of PSI. Instead of PSI “ideas”, the only acceptable material surface is 24/7-Flowing Liquid Lithium for low (0.5) recycling high performance regime compatible with burning plasma.

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