

Abstract Submitted
for the GEC05 Meeting of
The American Physical Society

Multipurpose temperature gradient probe: operation and applications PAVLO RUTKEVYCH, PSAC/NIE/NTU, Singapore, KOSTYA OSTRIKOV¹, School of Physics, The University of Sydney, Sydney NSW 2006, Australia, JIDONG LONG, SHUYAN XU, PSAC/NIE/NTU, Singapore — Development and applications of a versatile temperature gradient probe (TGP) for advanced in situ plasma diagnostics are reported. The probe is made of three stainless steel-shielded thermocouples. Hardware and software compensations provide stable and reproducible temperature readings even in high-power RF discharges. In addition to TG measurements, the metallic shields are used as cylindrical Langmuir probes (LPs), and provide valuable information about ion and electron densities and ion temperature by using the Laframboise model of ion collection. Independent estimation of plasma potential and thermo-emission current is made through direct temperature readings. This high-efficiency and low-cost hybrid TG/LP in situ diagnostics has been used to map the species distribution in Ar+H₂+CH₄ inductively coupled plasmas used for plasma enhanced chemical vapour deposition of ordered carbon microemitter arrays. In particular, the TGP diagnostics confirms that the quality of microemitter structures can be managed by thermophoretically manipulating plasma-grown nanoparticles in the near-substrate areas.

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Date submitted: 13 Jun 2005

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