



Materials Science & Technology

PMP Calibration exercise

September 2007

a cooperation of EMPA and METAS

Martin Mohr & Daniel Schreiber (Empa)

Jürg Schlatter (METAS)

Contact: martin.mohr@empa.ch

Instrumentation

EMPA

METAS

PNC

TSI CPC3010 S/N 70410281

TSI CPC3010 S/N 2400

TSI CPC3010 S/N 2435

Electrometer

TSI 3068B S/N 70701106

ME

VPR

Ejector (Palas) – ET (EMPA) – Ejector (Palas)

Aerosol

PNC

Hot wire - Pd

CAST - soot

VPR PCRF

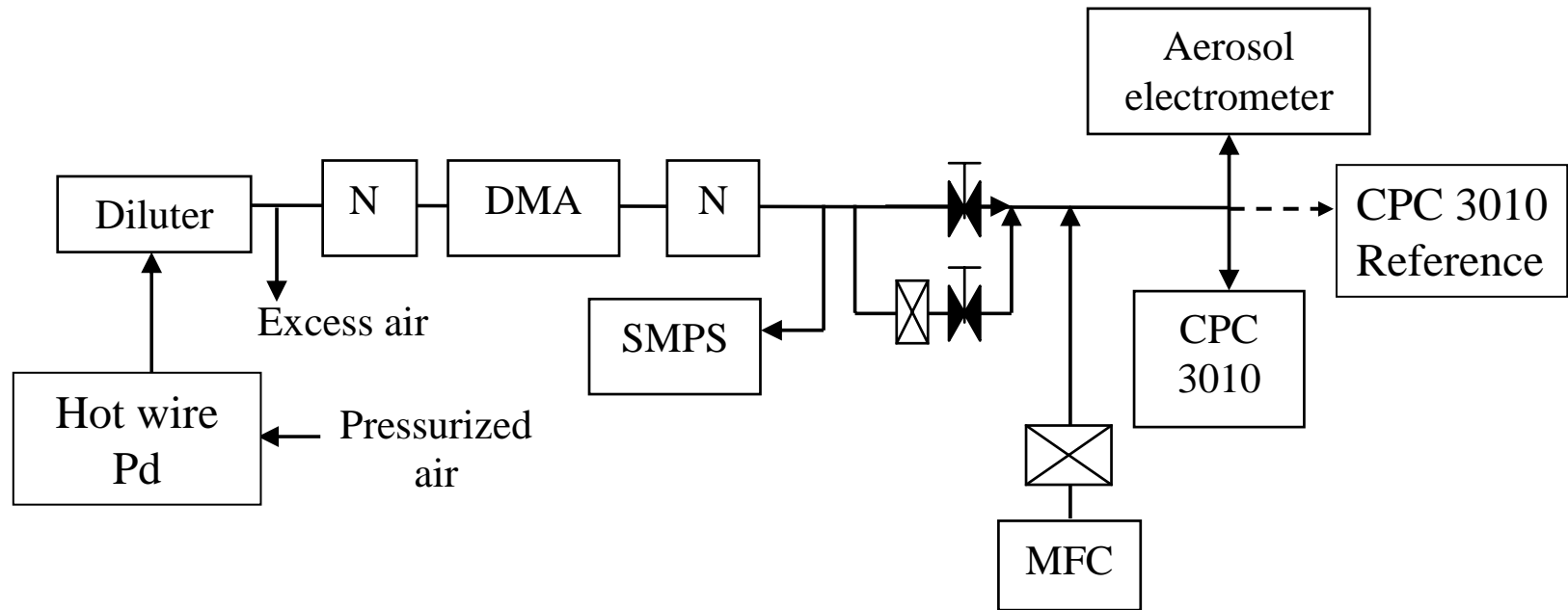
Atomizer - NaCl

CAST - soot

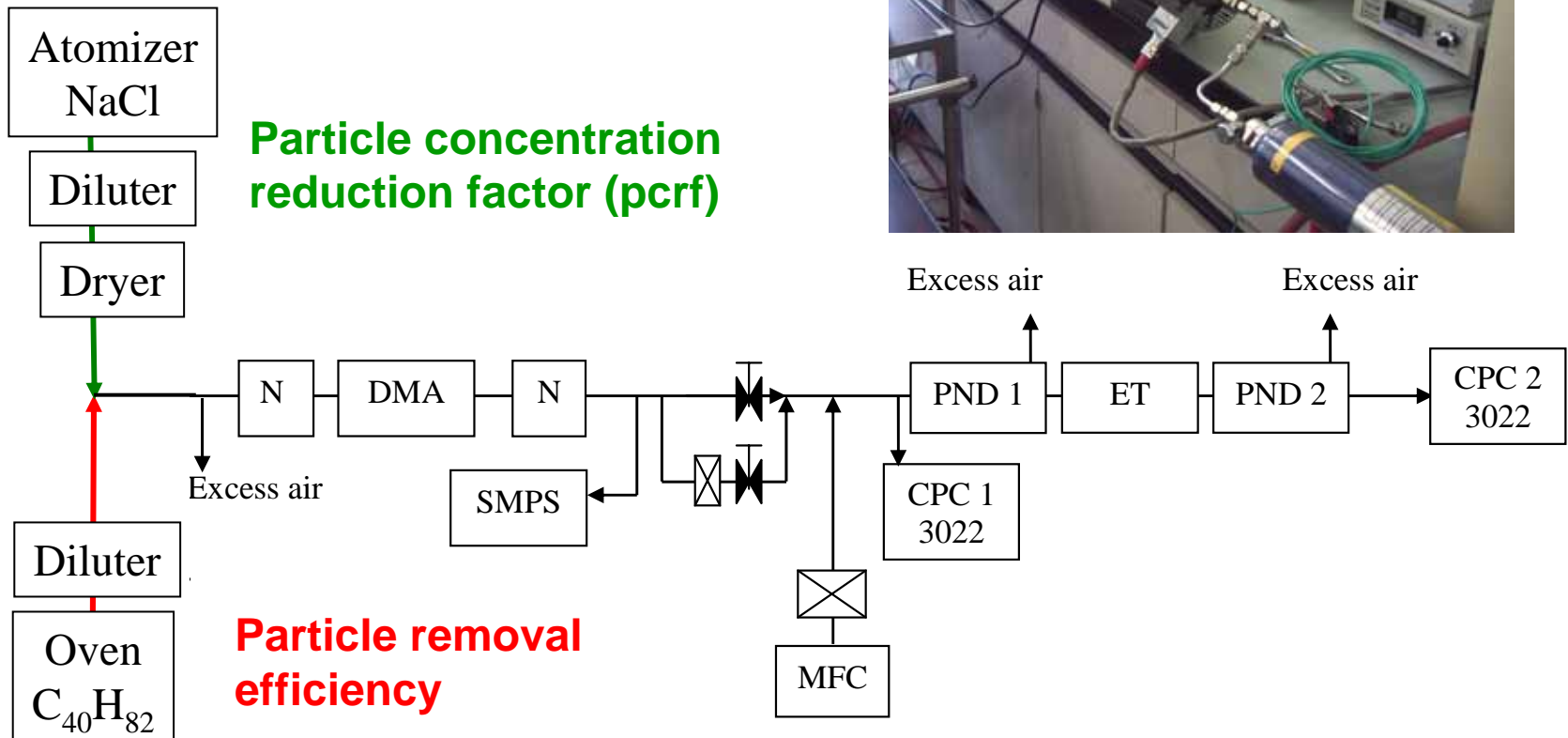
VPR effic.

Oven – C₄₀H₈₂

Experimental Set-up for PNC calibration



Experimental Set-up for VPR calibration



Primary PNC Calibration - Linearity

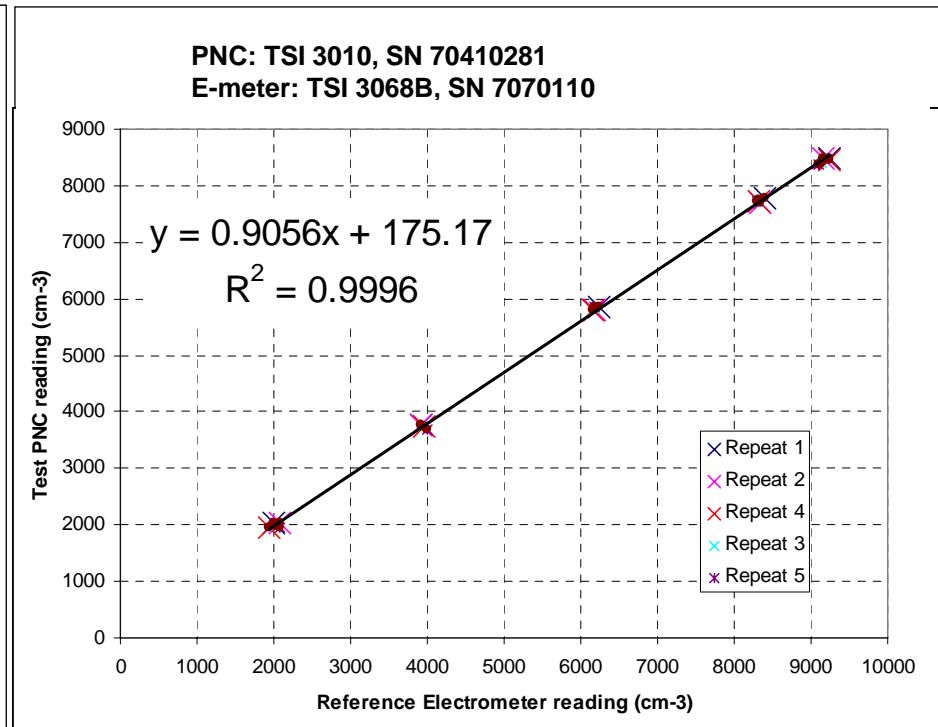
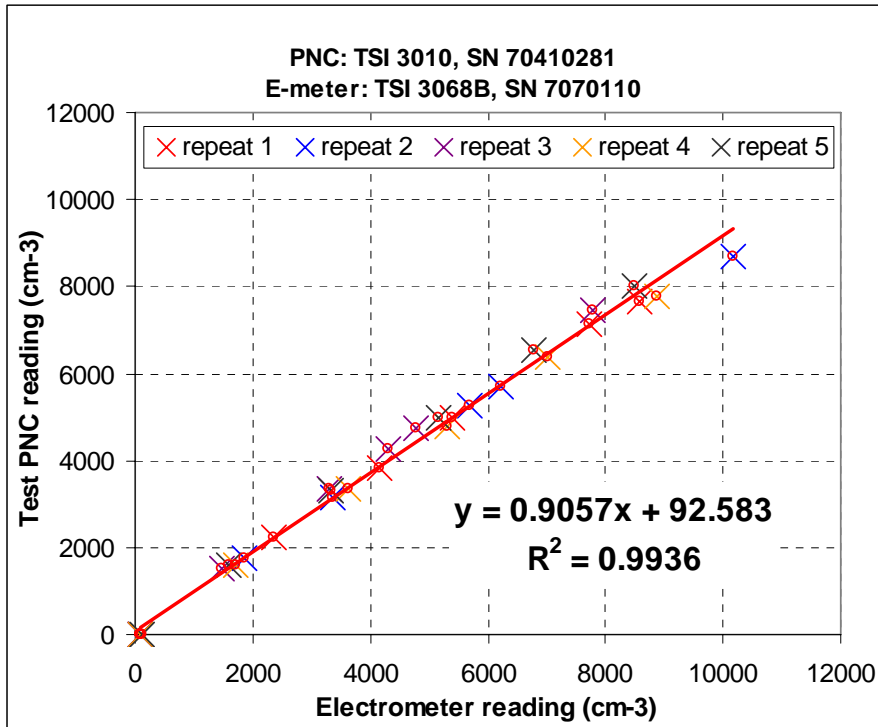
EMPA

Hot wire, Pd, 70 nm

Generator, Aerosol, size

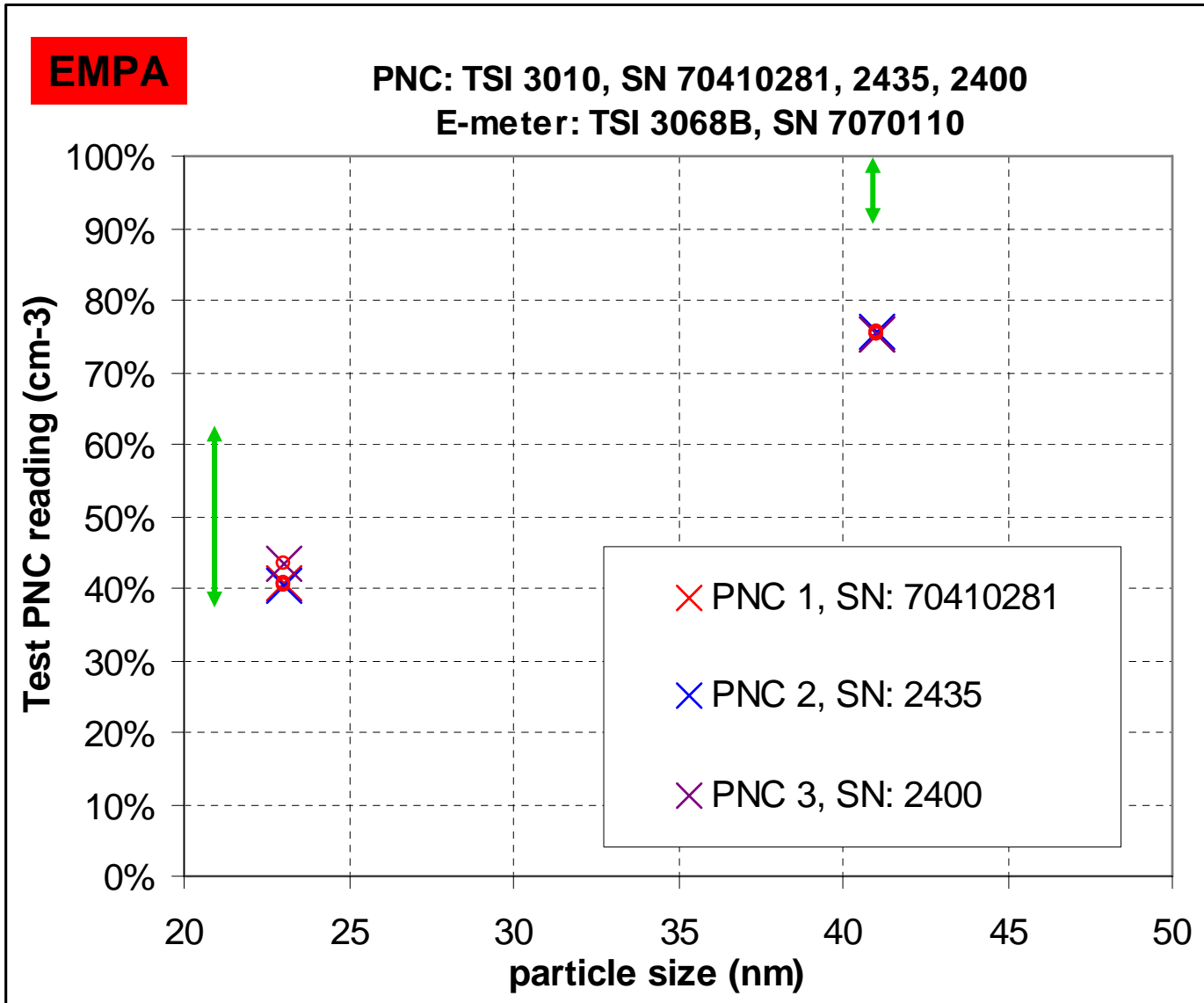
METAS

Cast, soot, 80 nm



Primary PNC Calibration – Cut-off characteristic

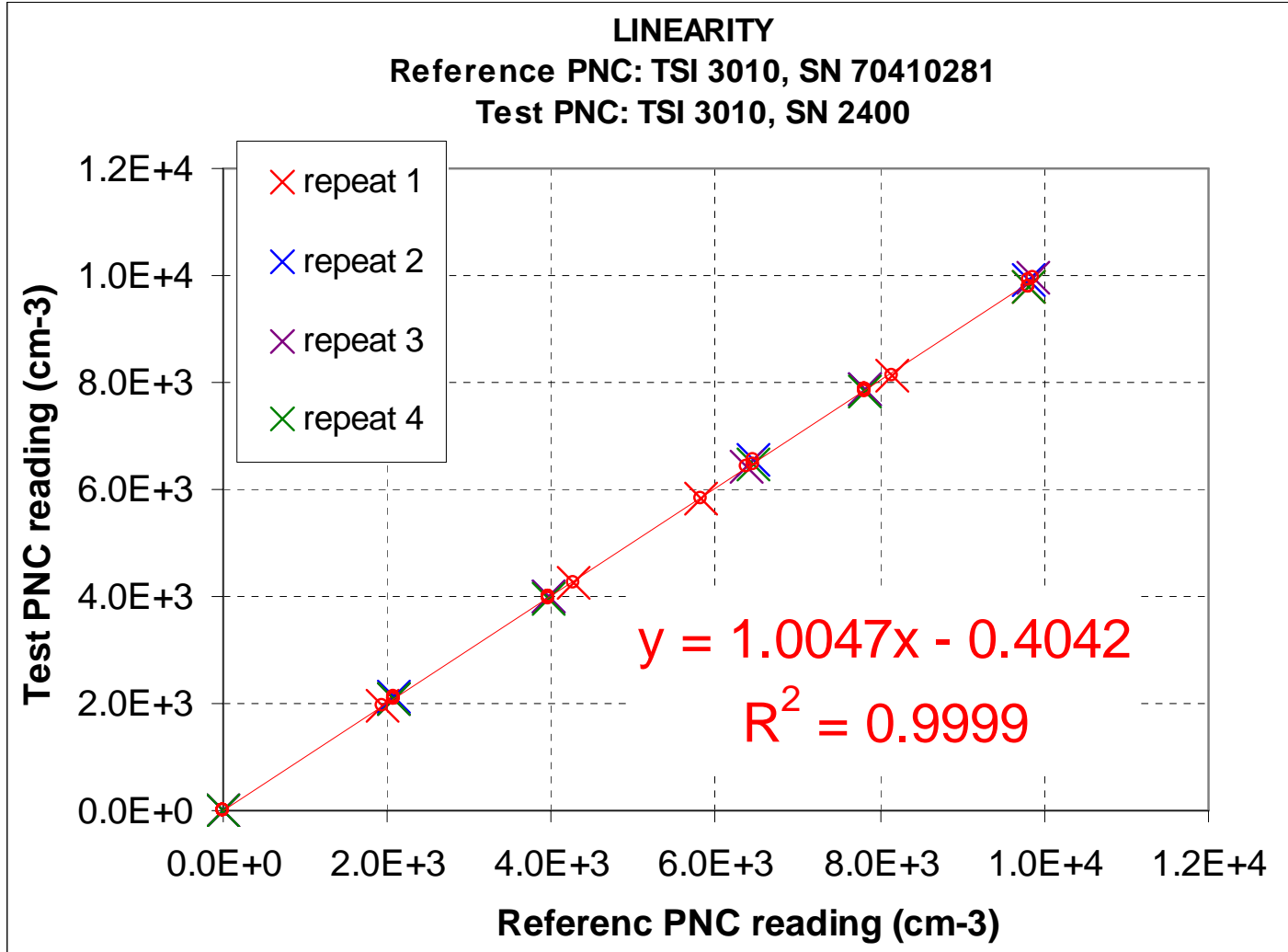
Generator, Aerosol, size **Hot wire, Pd,**



Secondary PNC Calibration - Linearity

EMPA

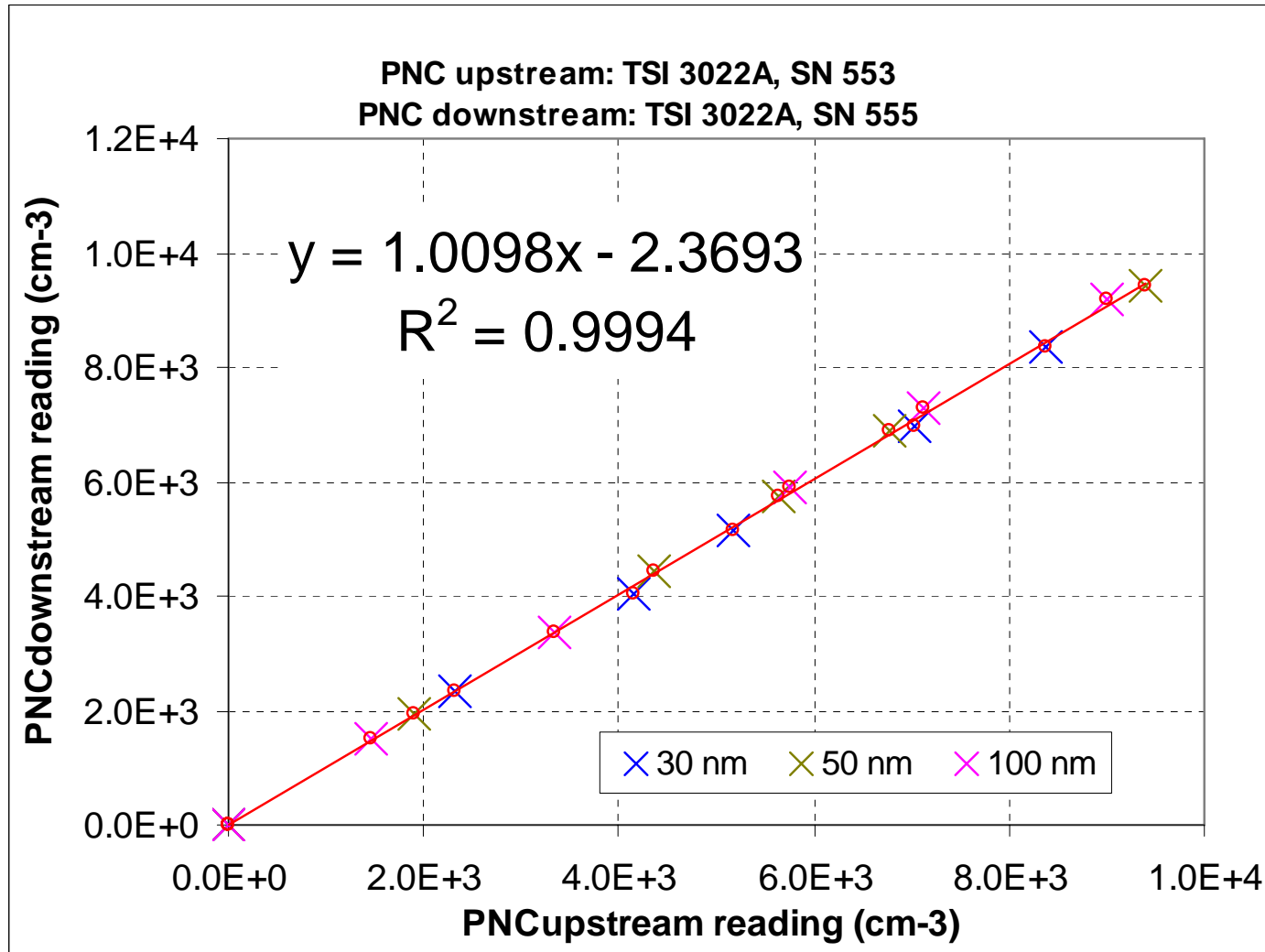
Generator, Aerosol Hot wire, Pd, 70 nm



VPR Calibration - PNC Comparison for „2 PNC Method“

EMPA

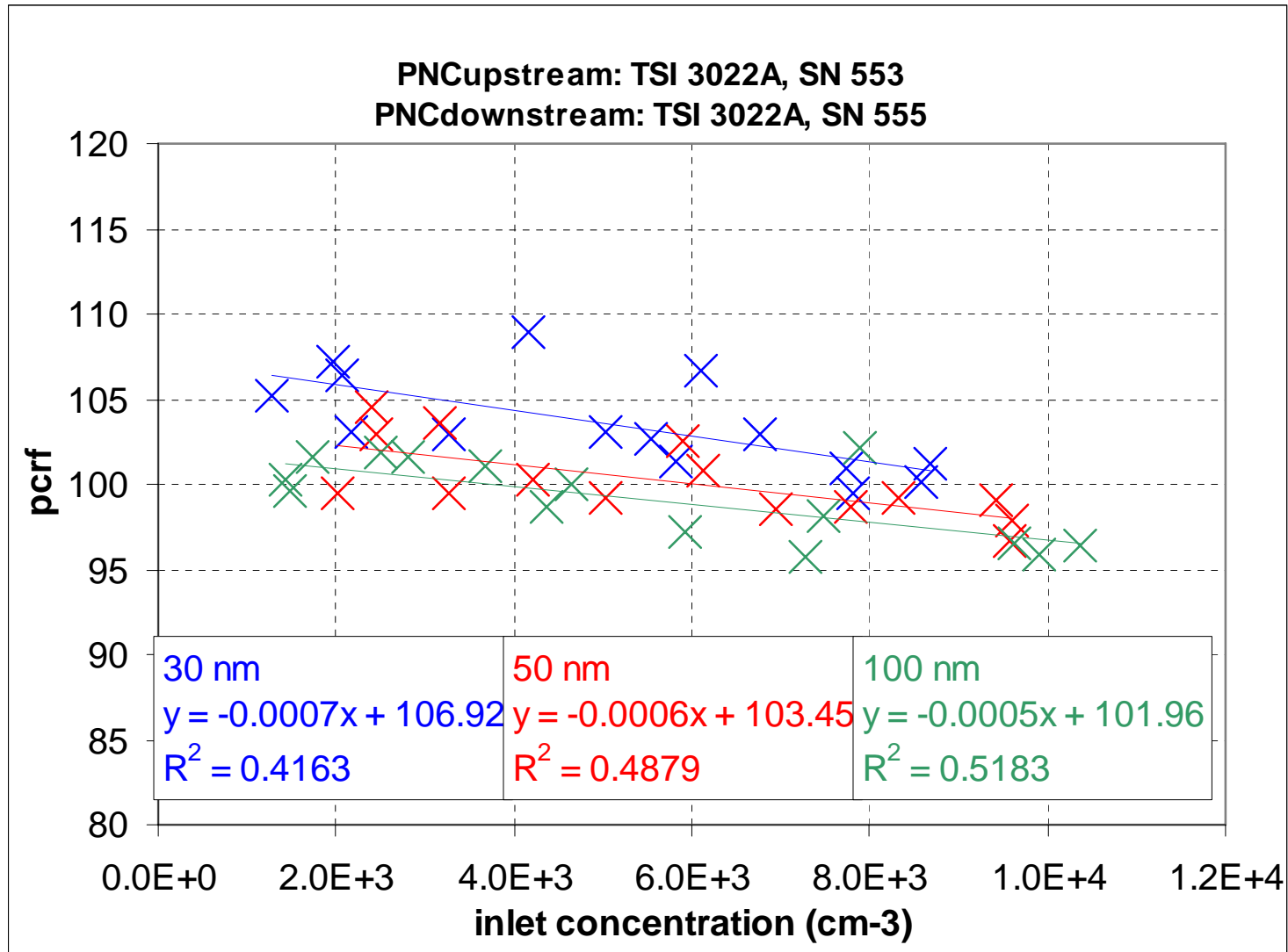
Generator, Aerosol Atomizer, NaCl, dp = 70 nm



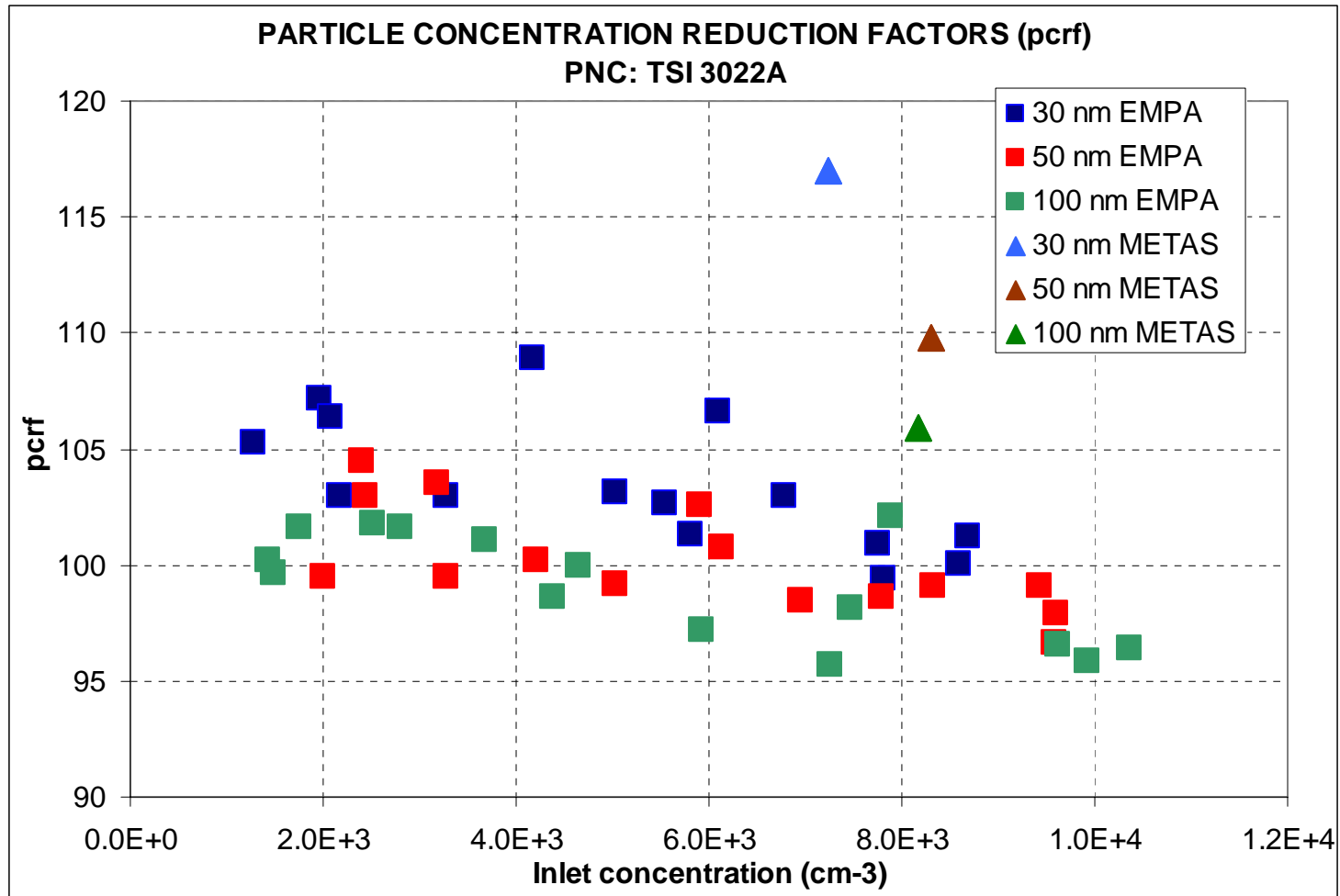
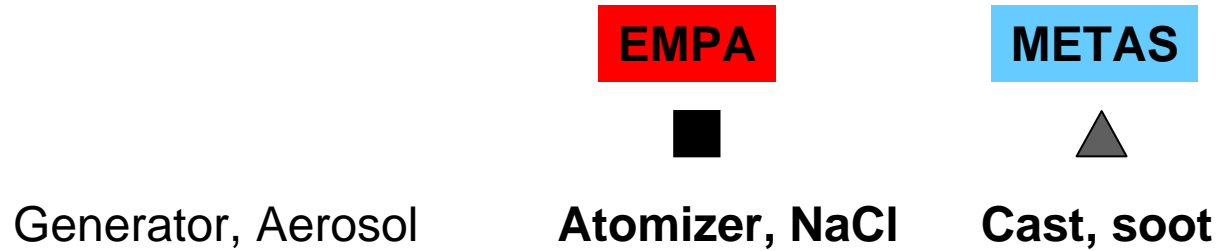
VPR Calibration – Particle concentration reduction factor (pcrf)

EMPA

Generator, Aerosol Atomizer, NaCl



VPR Calibration

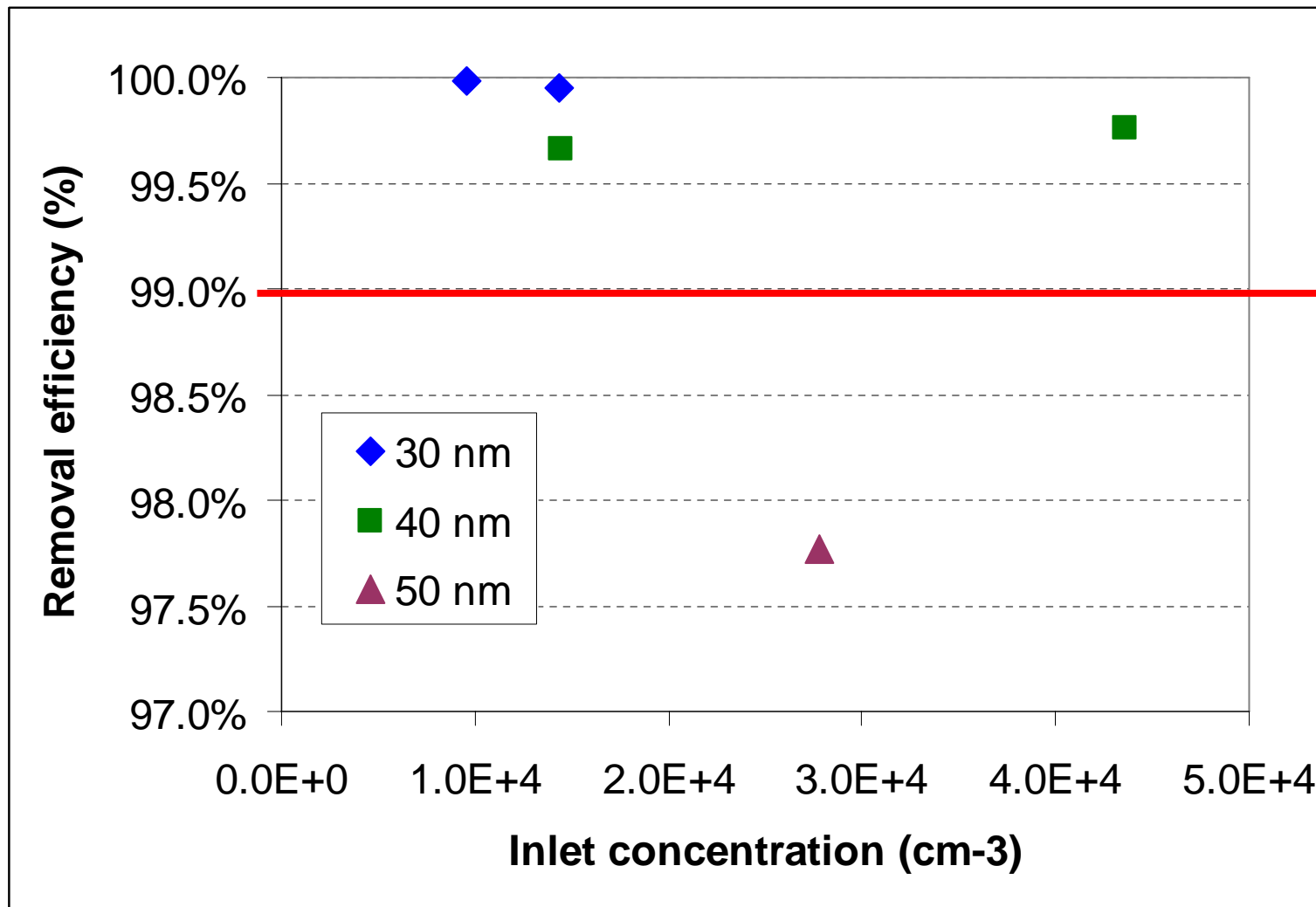


VPR Calibration – Volatile particle removal efficiency results


(2 PNC Method)

EMPA

Generator, Aerosol oven, $C_{40}H_{82}$



Open Questions

- Correction procedure for multiple charged particles 
- Tolerances for cut-point diameter
($23 \pm ?$ nm, $41 \pm ?$ nm)
- Counting efficiency tolerance at 41 nm
($90 \pm ?$ %)
- Data acquisition of instruments
- Acceptable pressure conditions at PNC inlet

Correction for multiple charged particles

