

TRACER

What's new TRACER 2.9

Negative Resist Process Calibration

Calibration
✕

Data

Name:

Description:

Preconditions for the TRACER Calibration include:
 1. An analytic PSF or a PSF from the archive
 2. A Dose vs. Density table obtained by exposing and evaluating a PEC corrected density varying pattern, obtainable from GenISys.
 3. Resist contrast value.

PSF parameter for calibration

Use analytical PSF

Beta [nm]: Eta:
 Gamma [nm]: Nu:

Use PSF from archive

2D-PSF:

Optimal contrast [%]: / : Uniform clearing [%]

Calibrated model

Resist-negative

Resist contrast: Thickness [nm]: D0 [uC/cm^2]:

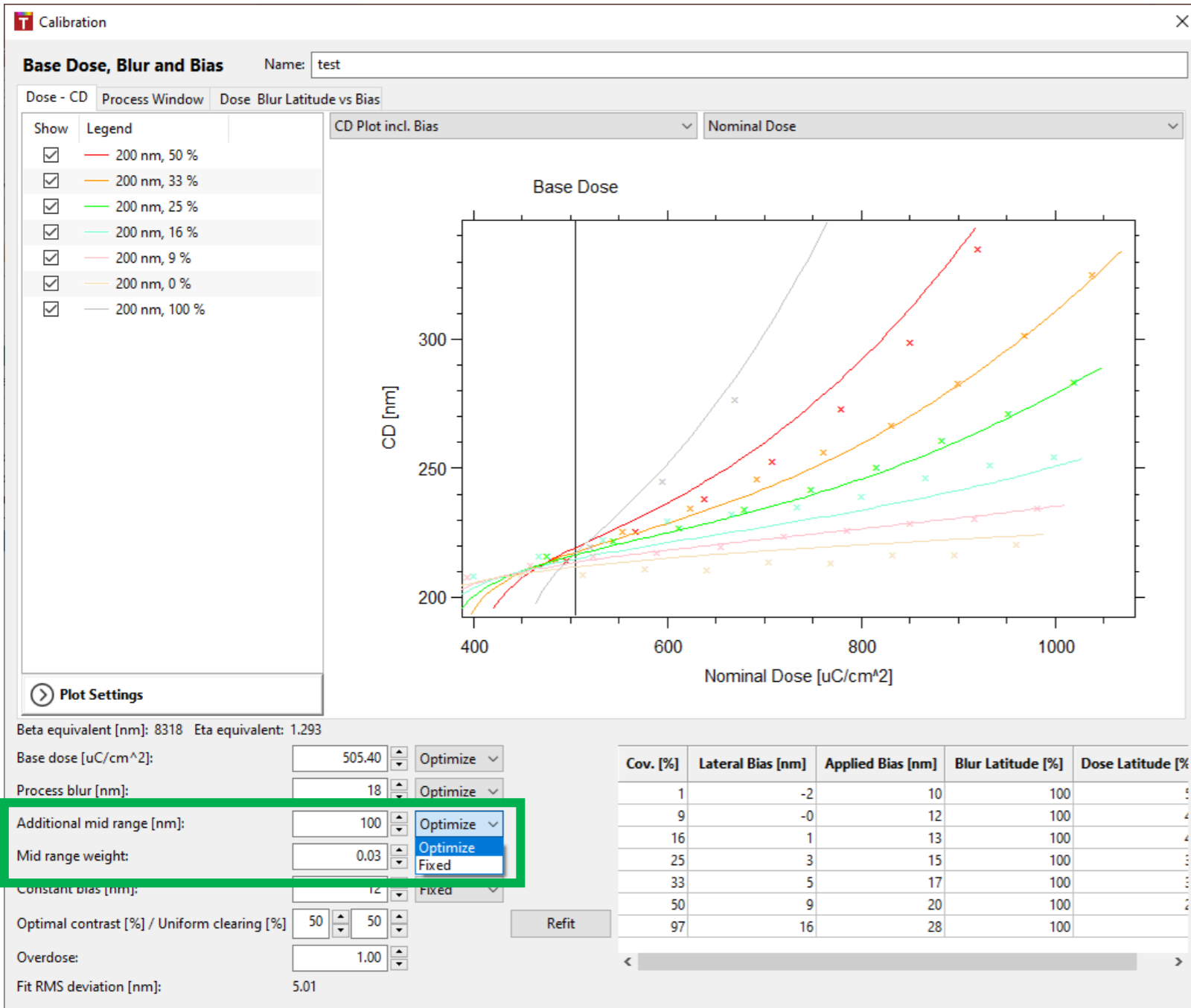
Data Properties

Proximity Effect Correction applied No Proximity Effect Correction applied

	A	B	C	D	E	F
1	Target CD [nm]	300	300	300	300	300
2	Density [%]	0.000	25.000	50.000	75.000	100.000

- The E-Beam process calibration now supports the calibration of negative resists.
- Calibration is available for both positive and negative resists.

Mid-range Contribution in Process Calibration



- In E-Beam process calibration, the mid-range as well as its weight is now available to be either manually fixed or optimized for a later refit.
 - The calibration accuracy is enhanced for process with a non-negligible mid-range effect.

Calibration

Data

Name: Test

Description:

Preconditions for the TRACER Calibration include:
 1. An analytic PSF or a PSF from the archive
 2. A Dose vs. Density table obtained by exposing and evaluating a PEC corrected density varying pattern, obtainable from GenISys.
 3. Resist contrast value.

PSF parameter for calibration

Use analytical PSF

Beta [nm]: 6918 Eta: 0.77
 Gamma [nm]: 0 Nu: 0.00

Use PSF from archive

2D-PSF: Substrate_Si_Thickness_700000_Energy_50_Layers_Resist_PMMA 200 nm_Z-Position_0.09_Electrons_2000000_Alpha_0_Beta_0_Eta_0_Gamma1_0_M Archive...

Optimal contrast [%]: 100 / 0 : Uniform clearing [%]

Calibrated model

Threshold Resist contrast: 2.50 Thickness [nm]: 200 D0 [uC/cm^2]: 500.00 From CC...

Use additional mid range fit term

Data Properties

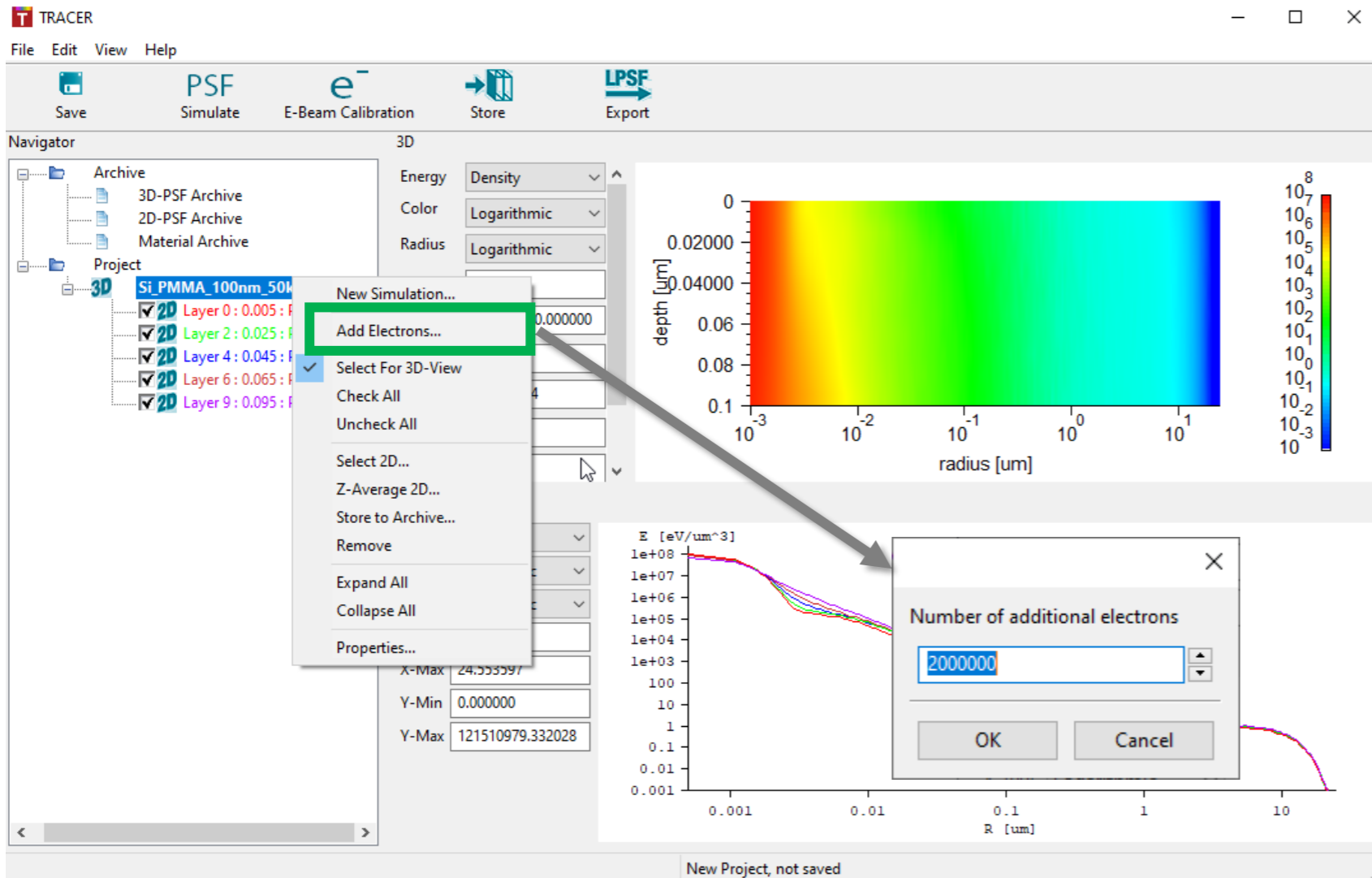
Proximity Effect Correction applied No Proximity Effect Correction applied

	A	B	C	D	E	F
1	Target CD [nm]	300	300	300	300	300
2	Density [%]	0.000	25.000	50.000	75.000	100.000
3	Dose [uC/cm^2]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]
4	97.5	283.84	292.81	288.66	0	0
5	102.5	296.1	298.91	297.77	296.3	288.65
6	107.5	296.6	298.39	299.04	300.78	297.51
7	112.5	303.27	310.23	312.93	315.06	310.85
8	117.5	304.15	310.36	316	321.81	315.76
9	125	302.1	309.88	322.24	323.45	319.68
10	130	308.02	316.52	327.14	331.92	327.62

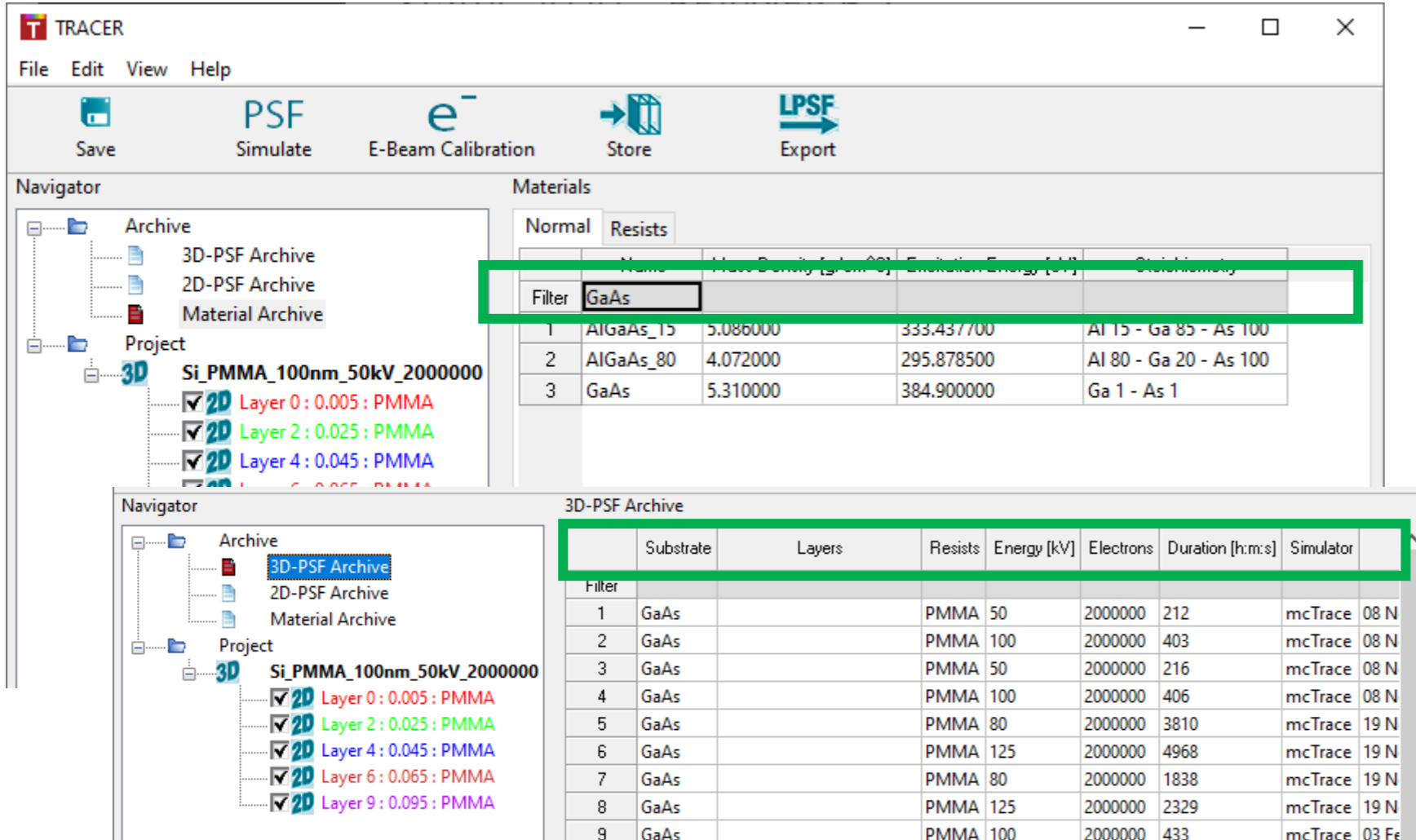
Add Dose
Add Dataset
Remove
Import...
Export...

- The E-Beam process calibration now also supports calibrations on measurements made on exposure data without PEC.
- The existing exposure without PEC can be imported for calibration.

Add Electrons to an Existing Simulation



- Right click on the existing PSF simulation result and “Add electrons...” is used to add more electrons in Monto-Carlo simulation.
- The PSF accuracy of existing simulation is enhanced by adding more electrons



The screenshot shows the TRACER software interface with two windows open. The top window displays the 'Materials' table with a filter set to 'GaAs'. The bottom window displays the '3D-PSF Archive' table with a filter set to 'GaAs' and a column selected for sorting.

Materials Table:

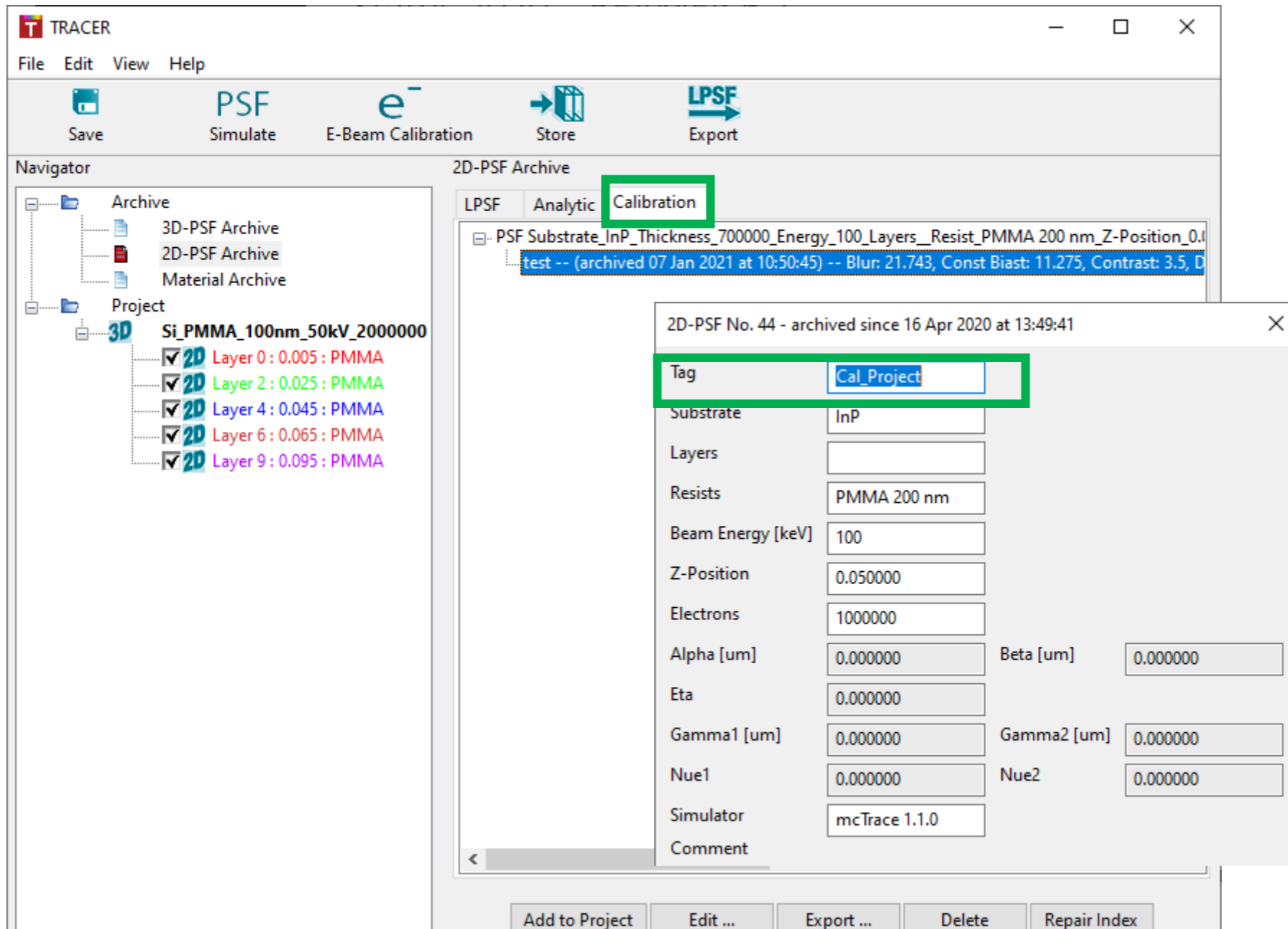
	Name	Mass Density [g/cm ³]	Excitation Energy [eV]	Stoichiometry
Filter	GaAs			
1	AlGaAs_15	5.086000	333.437700	Al 15 - Ga 85 - As 100
2	AlGaAs_80	4.072000	295.878500	Al 80 - Ga 20 - As 100
3	GaAs	5.310000	384.900000	Ga 1 - As 1

3D-PSF Archive Table:

	Substrate	Layers	Resists	Energy [kV]	Electrons	Duration [h:m:s]	Simulator	
Filter								
1	GaAs		PMMA	50	2000000	212	mcTrace	08 N
2	GaAs		PMMA	100	2000000	403	mcTrace	08 N
3	GaAs		PMMA	50	2000000	216	mcTrace	08 N
4	GaAs		PMMA	100	2000000	406	mcTrace	08 N
5	GaAs		PMMA	80	2000000	3810	mcTrace	19 N
6	GaAs		PMMA	125	2000000	4968	mcTrace	19 N
7	GaAs		PMMA	80	2000000	1838	mcTrace	19 N
8	GaAs		PMMA	125	2000000	2329	mcTrace	19 N
9	GaAs		PMMA	100	2000000	433	mcTrace	03 Fe

- In 3D-PSF, 2D-PSF and Material Archive, a Filter is available for quick searching.
- By clicking on the column name, the table entries can be sorted.

Rename Calibrated PSF



The screenshot shows the TRACER software interface. The 'Calibration' tab is selected in the '2D-PSF Archive' section. A dialog box titled '2D-PSF No. 44 - archived since 16 Apr 2020 at 13:49:41' is open, showing the 'Tag' field with the value 'Cal_Project' highlighted. The dialog box also displays various parameters for the PSF, including Substrate, Layers, Resists, Beam Energy, Z-Position, Electrons, Alpha, Beta, Eta, Gamma1, Gamma2, Nue1, Nue2, Simulator, and Comment.

Parameter	Value
Substrate	InP
Layers	
Resists	PMMA 200 nm
Beam Energy [keV]	100
Z-Position	0.050000
Electrons	1000000
Alpha [um]	0.000000
Beta [um]	0.000000
Eta	0.000000
Gamma1 [um]	0.000000
Gamma2 [um]	0.000000
Nue1	0.000000
Nue2	0.000000
Simulator	mcTrace 1.1.0
Comment	

- The calibrated PSF can be stored in an Archive, which is accessible in the “Calibration” Tab.
- A right-click on selected calibration can rename the Tag of the PSF for user convenience.