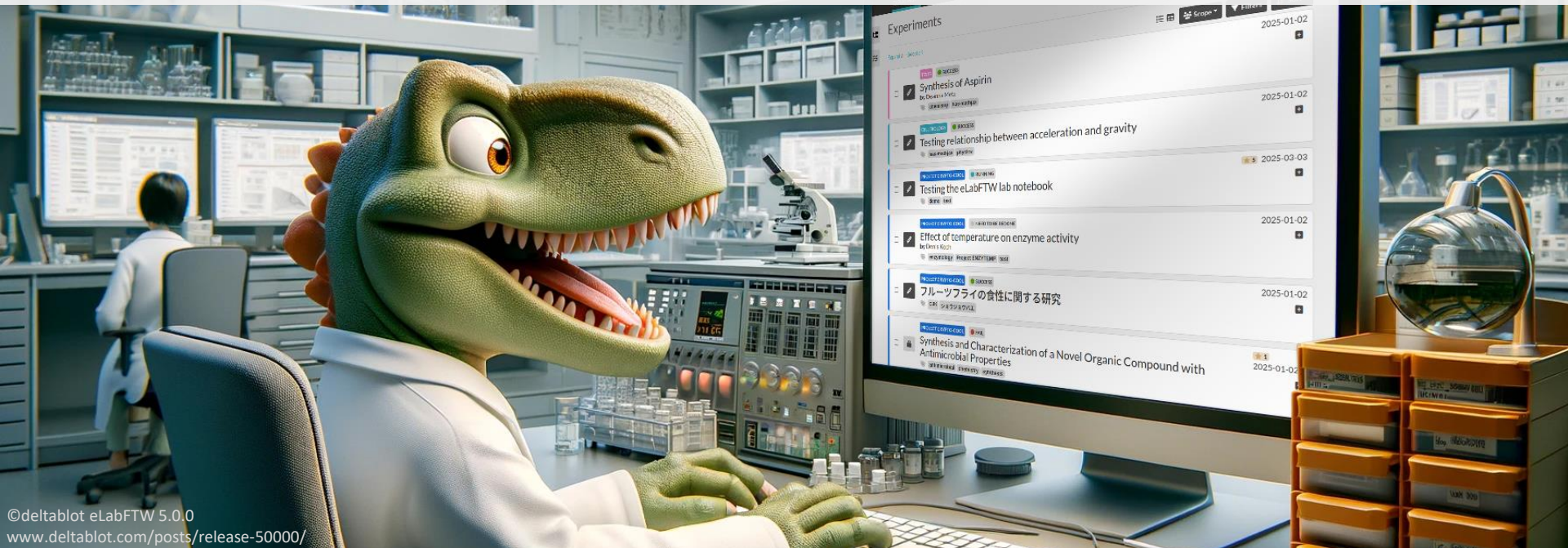


Introduction to eLabFTW for research and development in low-temperature plasma science



©deltablot eLabFTW 5.0.0
www.deltablot.com/posts/release-50000/

Kerstin Sgonina, Marina Prenzel, Markus Becker

Electronic lab books on the example of eLabFTW

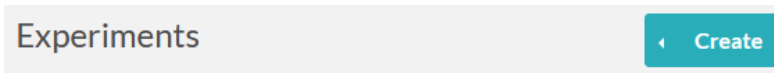
eLabFTW: open source platform, hosted on (own) server



Electronic lab books on the example of eLabFTW

eLabFTW: open source platform, hosted on (own) server

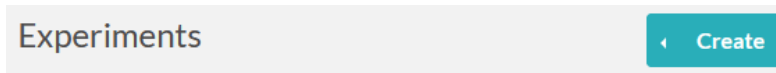
- **Documentation** analogous to paper lab books



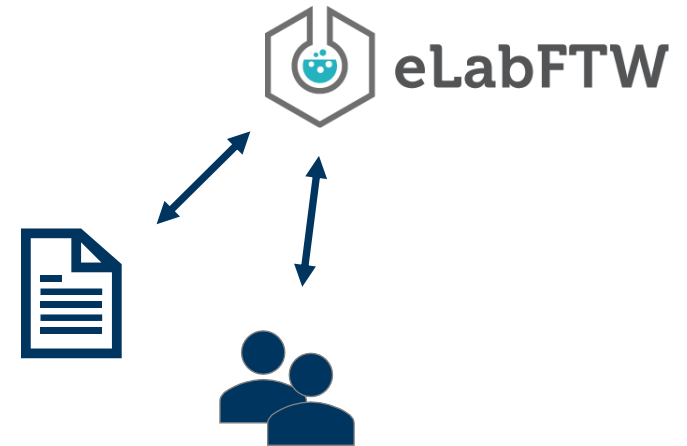
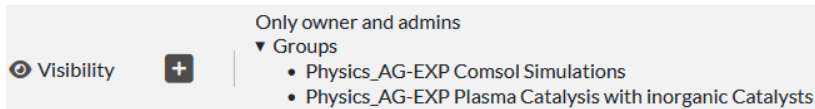
Electronic lab books on the example of eLabFTW

eLabFTW: open source platform, hosted on (own) server

- **Documentation** analogous to paper lab books



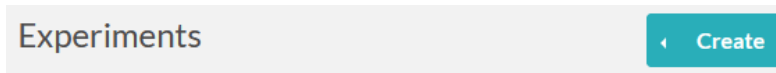
- Data entries are **shareable** among users



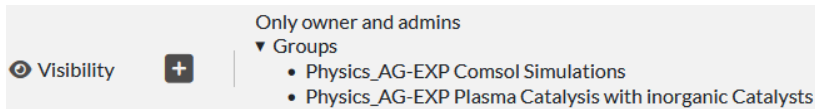
Electronic lab books on the example of eLabFTW

eLabFTW: open source platform, hosted on (own) server

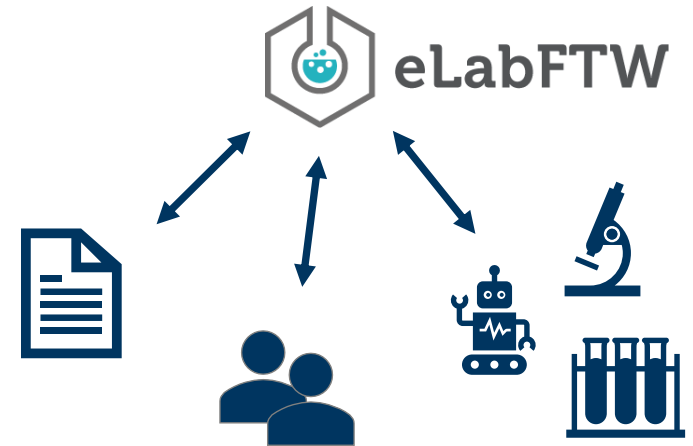
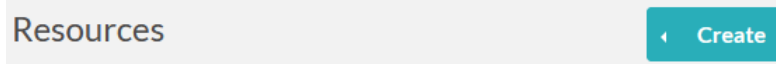
- **Documentation** analogous to paper lab books



- Data entries are **shareable** among users



- **Organization** of samples, devices, ...



Documentation in eLabFTW



Lab book entries are organized in “Experiments”

Experiments Create

Expand all - Select all Scope Filters Sort

Date	Title	Next step	Category	Status	Tags	Rating	Owner
<input type="checkbox"/> 2024-05-06	Testing of Dielectric Spray Coating between Glasses 1-3		PLASMA CATALYSIS	SUCCESS			user YX
<input type="checkbox"/> 2024-05-04	Check different Aquisition Rates at same Speed		NANODUSTY PLASMA	RUNNING	RCP		user ZX
<input type="checkbox"/> 2024-05-02	Fluid Flow Simulation of QuartzDomeReactor - Comsol Simulation		COMSOL	RUNNING	comsol fluid flow simulation QuartzDomeReactor		user ZZ
<input type="checkbox"/> 2024-05-02	Testing of Coppercable and MKSControlGI		PLASMA CATALYSIS	SUCCESS	POS		user XX
<input type="checkbox"/> 2024-05-02	Influence of the GAS flow rate, the differential pumping strength and the SFB flow rate on the holding capabilities of coated ag nps		MULTIPATH SETUP	RUNNING	aCH Ag AG-Benedikt nanoparticles		user XZ
<input type="checkbox"/> 2024-04-30	20240430_50nm_1.0x0.25mm_VUV_Capillary_Jet_Vacuum		VUV-SPECTROMETER	SUCCESS	atmospheric pressure plasma microplasma OES VUV VUV spectrometer		user XY

Sharing data entries in eLabFTW



Sharing with different “Groups” of people

Experiments > Viewing an entry Create

← | | | | 📌 | 🔒 | ⋮

Started on 2024-05-02

Fluid Flow Simulation of QuartzDomeReactor - Comsol Simulation

Team: Physics_AG-Exp

Category: COMSOL

Status: RUNNING

Tags: comsol, fluid flow simulation, QuartzDomeReactor

Visibility: +

- Only owner and admins
- Groups
 - Physics_AG-EXP Comsol Simulations
 - Physics_AG-EXP Plasma Catalysis with inorganic Catalysts

Can write: + Only owner and admins

MAIN TEXT

Sharing data entries in eLabFTW



Sharing with different “Groups” of people

Experiments > Viewing an entry Create

← | | | | 📌 | 🔒 | ⋮

Started on 2024-05-02

Fluid Flow Simulation of QuartzDomeReactor - Comsol Simulation

Team: Physics_AG-Exp
Category: COMSOL
Status: RUNNING
Tags: comsol, fluid flow simulation, QuartzDomeReactor

Visibility

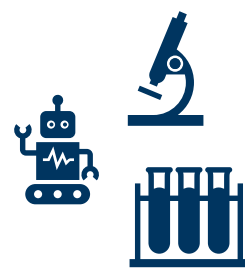
Only owner and admins

- Groups
 - Physics_AG-EXP Comsol Simulations
 - Physics_AG-EXP Plasma Catalysis with inorganic Catalysts

Can write Only owner and admins

MAIN TEXT

Organization in eLabFTW



Devices, samples, etc. are organized as “Resources”

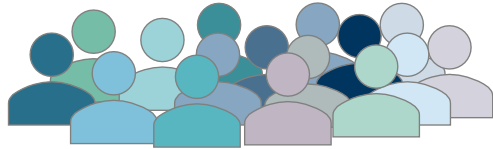
Resources Create

Expand all - Select all Scope Filters Sort

Date	Title	Next step	Category	Status	Tags	Rating	Owner
<input type="checkbox"/> 2024-05-06	Pfeiffer Vacuum TPG 261 SingleGauge Measurement & Control Unit 44263063		DEVICES	WORKING			user XY
<input type="checkbox"/> 2024-04-23	Coaxial Power Systems RFG 050-13 - S/N 1758-1		RF-GENERATOR	WORKING			user YX
<input type="checkbox"/> 2024-04-23	Dressler CESAR 133 - S/N 613000000061		RF-GENERATOR	WORKING			user ZX
<input type="checkbox"/> 2024-04-23	Sunon DP201A Fan P/N 2123HST.GN		DEVICES	WORKING			user ZZ
<input type="checkbox"/> 2024-04-18	Overview RF-Cable RG58		RF-CABLE	WORKING			user XX
<input type="checkbox"/> 2024-04-05	IDS U3-3560XCP-C-HQ		CAMERAS	WORKING			user XZ
<input type="checkbox"/> 2024-04-05	Telecentric Objective RCP2		OPTICAL DEVICES	WORKING			user XX

Structure in eLabFTW

– an example of the Experimental Plasma Physics Group Kiel



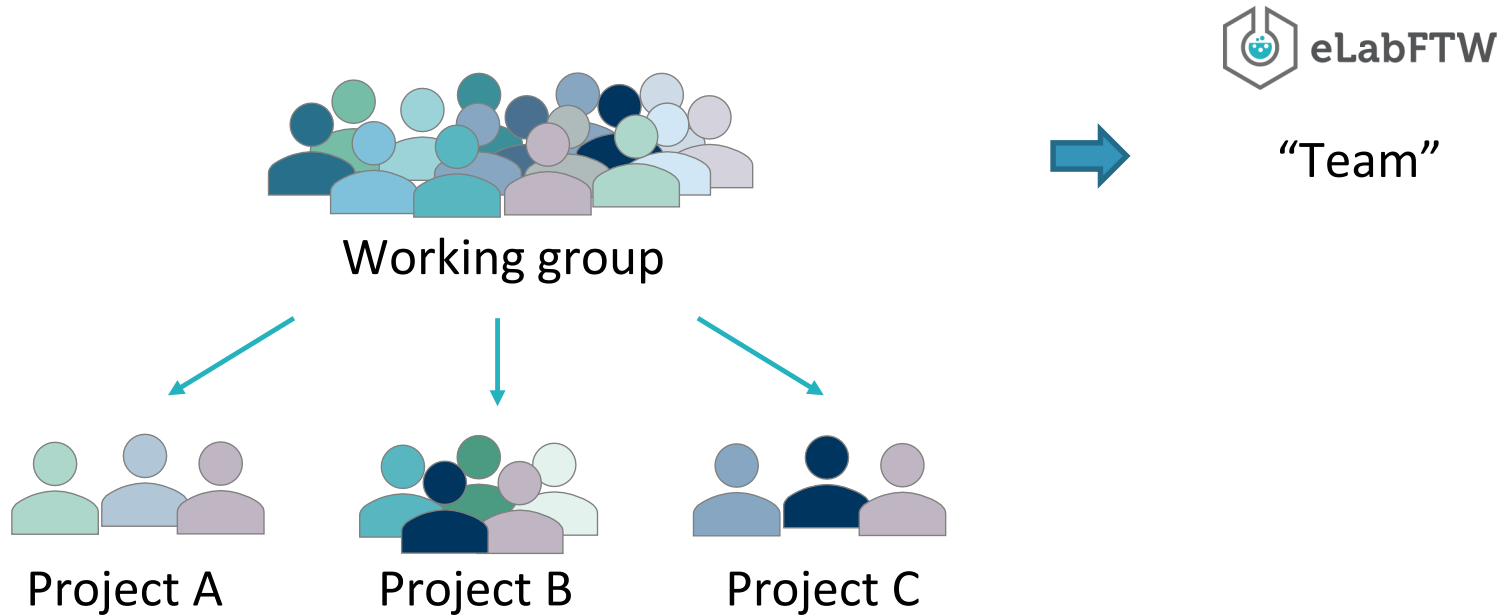
Working group



“Team”

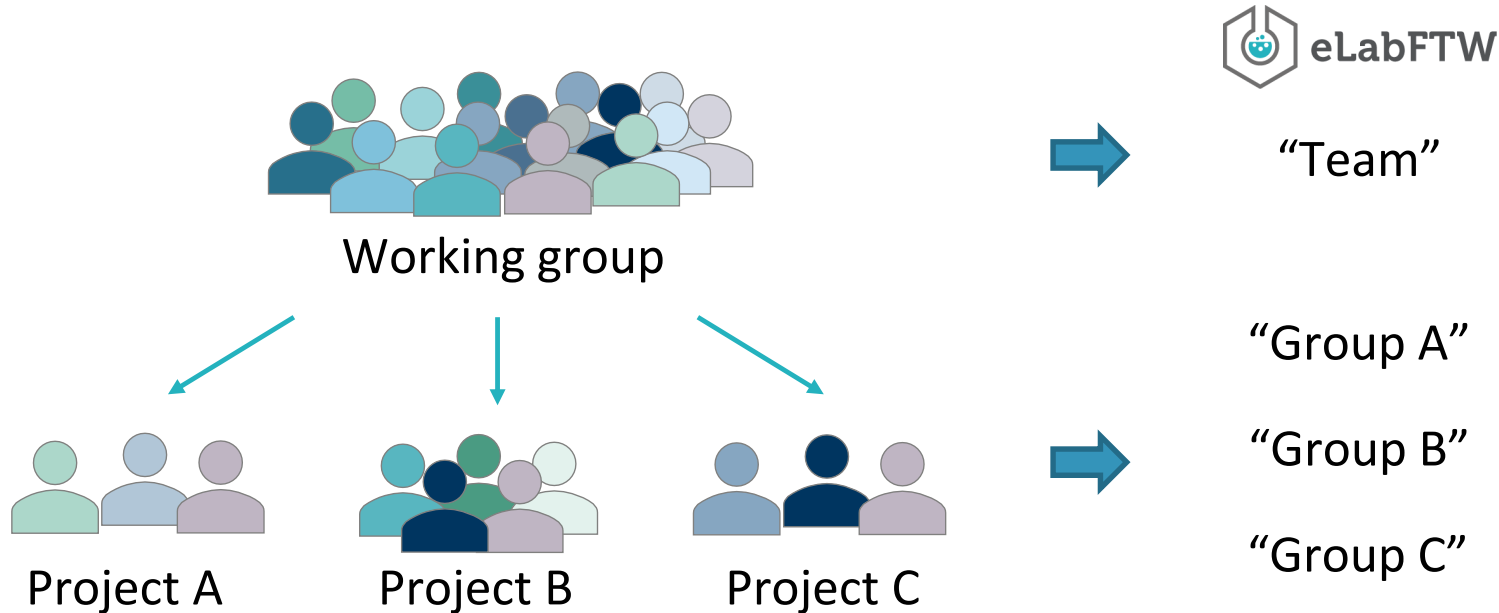
Structure in eLabFTW

– an example of the Experimental Plasma Physics Group Kiel



Structure in eLabFTW

– an example of the Experimental Plasma Physics Group Kiel

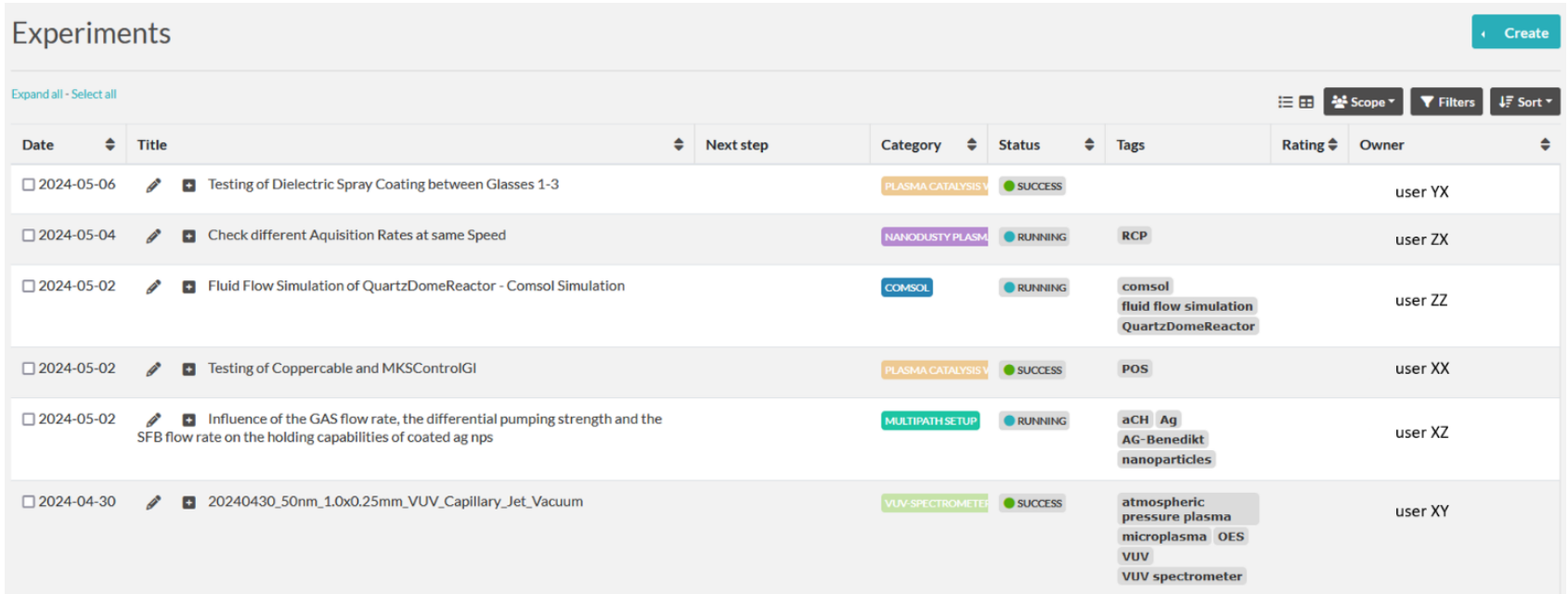


Members can be part of multiple projects/groups

Structure in eLabFTW – Experiments

– an example of the Experimental Plasma Physics Group Kiel

“Experiments” can be sorted in “Categories” according to the related Project



The screenshot displays the 'Experiments' section of the eLabFTW interface. It features a table with columns for Date, Title, Next step, Category, Status, Tags, Rating, and Owner. The table contains six rows of experiment data. Each row includes a checkbox, a date, a title with edit and add icons, a category tag, a status indicator, a list of tags, a rating, and the owner's name. The interface also includes a 'Create' button in the top right, an 'Expand all - Select all' link, and filter options for Scope, Filters, and Sort.

Date	Title	Next step	Category	Status	Tags	Rating	Owner
<input type="checkbox"/> 2024-05-06	Testing of Dielectric Spray Coating between Glasses 1-3		PLASMA CATALYSIS	SUCCESS			user YX
<input type="checkbox"/> 2024-05-04	Check different Aquisition Rates at same Speed		NANODUSTY PLASMA	RUNNING	RCP		user ZX
<input type="checkbox"/> 2024-05-02	Fluid Flow Simulation of QuartzDomeReactor - Comsol Simulation		COMSOL	RUNNING	comsol fluid flow simulation QuartzDomeReactor		user ZZ
<input type="checkbox"/> 2024-05-02	Testing of Coppercable and MKSControlGI		PLASMA CATALYSIS	SUCCESS	POS		user XX
<input type="checkbox"/> 2024-05-02	Influence of the GAS flow rate, the differential pumping strength and the SFB flow rate on the holding capabilities of coated ag nps		MULTIPATH SETUP	RUNNING	aCH Ag AG-Benedikt nanoparticles		user XZ
<input type="checkbox"/> 2024-04-30	20240430_50nm_1.0x0.25mm_VUV_Capillary_Jet_Vacuum		VUV-SPECTROMETER	SUCCESS	atmospheric pressure plasma microplasma OES VUV VUV spectrometer		user XY

Structure in eLabFTW – Experiments

– an example of the Experimental Plasma Physics Group Kiel

“Experiments” can be sorted in “Categories” according to the related Project

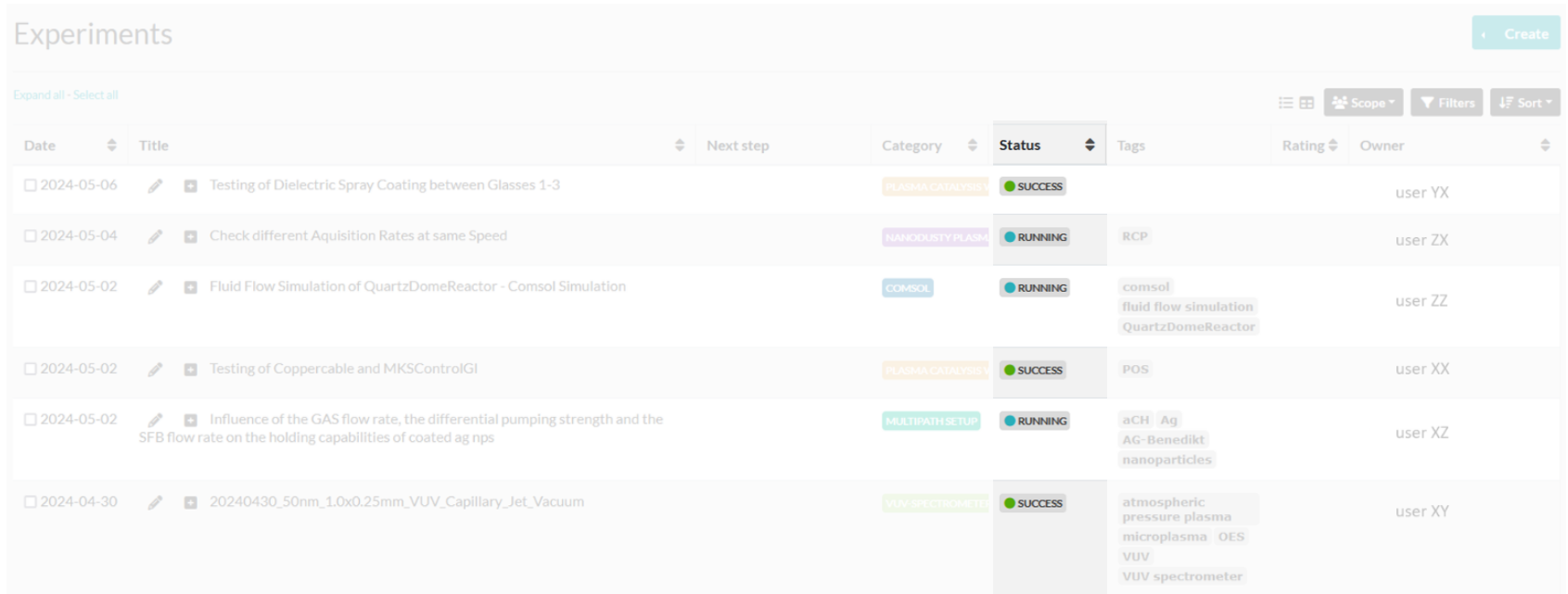
The screenshot displays the 'Experiments' section of the eLabFTW interface. It features a table with the following columns: Date, Title, Next step, Category, Status, Tags, Rating, and Owner. The table contains six entries, each with a checkbox, an edit icon, a plus icon, and a title. The categories are color-coded: PLASMA CATALYSIS (orange), NANODUSTY PLASMA (purple), COMSOL (blue), MULTIPATH SETUP (green), and VUV-SPECTROMETER (light green). The status is indicated by a colored circle: SUCCESS (green) or RUNNING (blue). The tags are listed in a grey box. The interface also includes a 'Create' button in the top right, an 'Expand all - Select all' link, and navigation icons for Scope, Filters, and Sort.

Date	Title	Next step	Category	Status	Tags	Rating	Owner
<input type="checkbox"/> 2024-05-06	Testing of Dielectric Spray Coating between Glasses 1-3		PLASMA CATALYSIS	SUCCESS			user YX
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<input type="checkbox"/> 2024-05-02	Influence of the GAS flow rate, the differential pumping strength and the SFB flow rate on the holding capabilities of coated ag nps		MULTIPATH SETUP	RUNNING	aCH Ag AG-Benedikt nanoparticles		user XZ
<input type="checkbox"/> 2024-04-30	20240430_50nm_1.0x0.25mm_VUV_Capillary_Jet_Vacuum		VUV-SPECTROMETER	SUCCESS	atmospheric pressure plasma microplasma OES VUV VUV spectrometer		user XY

Structure in eLabFTW – Experiments

– an example of the Experimental Plasma Physics Group Kiel

“Experiments” can have a “Status”



The screenshot shows a table titled "Experiments" with a "Create" button in the top right. Below the title is a link "Expand all - Select all". The table has columns for Date, Title, Next step, Category, Status, Tags, Rating, and Owner. The Status column is highlighted with a dropdown arrow. The table contains six rows of experimental data.






Date	Title	Next step	Category	Status	Tags	Rating	Owner
<input type="checkbox"/> 2024-05-06	Testing of Dielectric Spray Coating between Glasses 1-3		PLASMA CATALYSIS	SUCCESS			user YX
<input type="checkbox"/> 2024-05-04	Check different Aquisition Rates at same Speed		NANOPLASTY PLASMA	RUNNING	RCP		user ZX
<input type="checkbox"/> 2024-05-02	Fluid Flow Simulation of QuartzDomeReactor - Comsol Simulation		COMSOL	RUNNING	comsol fluid flow simulation QuartzDomeReactor		user ZZ
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<input type="checkbox"/> 2024-04-30	20240430_50nm_1.0x0.25mm_VUV_Capillary_Jet_Vacuum		VUV SPECTROMETRY	SUCCESS	atmospheric pressure plasma microplasma OES VUV VUV spectrometer		user XY

Structure in eLabFTW – Experiments

– an example of the Experimental Plasma Physics Group Kiel

“Experiments” can have a “Status”

e.g.:

Name	Color
☰ running	
Name	Color
☰ success	
Name	Color
☰ must be repeated	
Name	Color
☰ failure	
Name	Color
☰ delete me!	

Structure in eLabFTW – Experiments

– an example of the Experimental Plasma Physics Group Kiel

Creating an entry “Experiments”

- Fill your white-space with text, tables, screenshots, sketches etc.
- Create a template for this kind of measurement
- Link resources or other experiments

Started on 2024-03-15
voltage measurement of RF generator at POS

Team: Physics_AG_Exp
Category: [voltage measurement](#)
Status: SUCCESS
Tags: atmospheric pressure plasma, POS

Visibility: Only members of the team
Groups: [Groups](#)
Can write: Only owner and admins

MAIN TEXT
Date: Fri, 15 Mar 2024, 13:38
Preparation:
assemble POS without sample, high voltage probe is attached to powered electrode
Operation:
matching: CT = 130, CL = 510

P _{forward} [W]	P _{reflected} [W]	V _{max} [kV]
10	0	0,626
25	0	0,632
40	0	0,784
60	0	0,944
80	0	1,09
100	1	1,22
120	1	1,31
140	1	1,39
160	1	1,47
180	2	1,54
200	2	1,58
220	2	1,66
240	3	1,72
220	2	1,65
200	2	1,58
180	1	1,54
160	1	1,46
140	1	1,38
120	1	1,30
100	1	1,20
80	0	1,08
70	0	1,01
60	0	0,944
50	0	0,87
40	0	0,78
30	0	0,68
20	0	0,57
10	0	0,43
5	0	0,33

15.03.2024 POS 1@MHz

Structure in eLabFTW – Resources

– an example of the Experimental Plasma Physics Group Kiel

“Resources” can be sorted in “Categories”

Resources Create

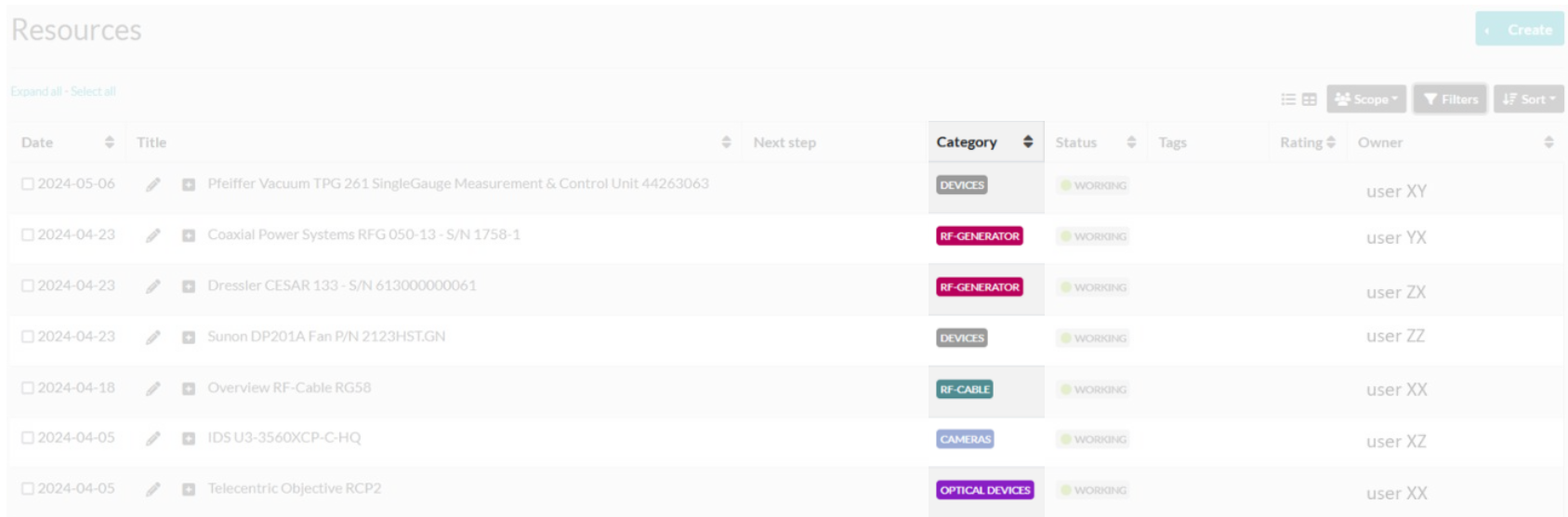
Expand all - Select all Scope Filters Sort

Date	Title	Next step	Category	Status	Tags	Rating	Owner
<input type="checkbox"/> 2024-05-06	Pfeiffer Vacuum TPG 261 SingleGauge Measurement & Control Unit 44263063		DEVICES	WORKING			user XY
<input type="checkbox"/> 2024-04-23	Coaxial Power Systems RFG 050-13 - S/N 1758-1		RF-GENERATOR	WORKING			user YX
<input type="checkbox"/> 2024-04-23	Dressler CESAR 133 - S/N 613000000061		RF-GENERATOR	WORKING			user ZX
<input type="checkbox"/> 2024-04-23	Sunon DP201A Fan P/N 2123HST.GN		DEVICES	WORKING			user ZZ
<input type="checkbox"/> 2024-04-18	Overview RF-Cable RG58		RF-CABLE	WORKING			user XX
<input type="checkbox"/> 2024-04-05	IDS U3-3560XCP-C-HQ		CAMERAS	WORKING			user XZ
<input type="checkbox"/> 2024-04-05	Telecentric Objective RCP2		OPTICAL DEVICES	WORKING			user XX

Structure in eLabFTW – Resources

– an example of the Experimental Plasma Physics Group Kiel

“Resources” can be sorted in “Categories”



Resources Create

Expand all - Select all Scope Filters Sort

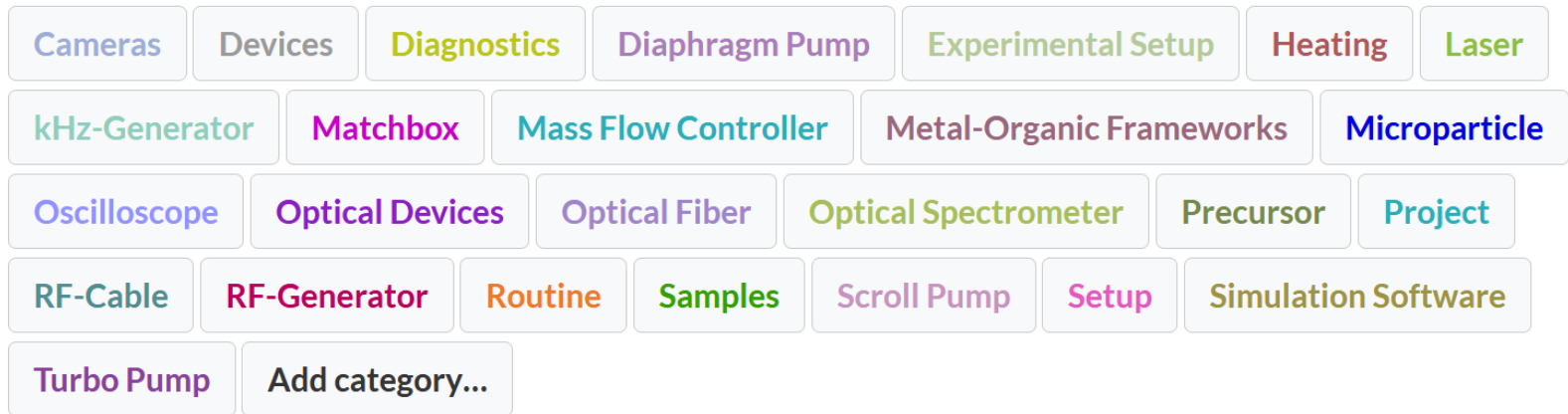
Date	Title	Next step	Category	Status	Tags	Rating	Owner
<input type="checkbox"/> 2024-05-06	Pfeiffer Vacuum TPG 261 SingleGauge Measurement & Control Unit 44263063		DEVICES				user XY
<input type="checkbox"/> 2024-04-23	Coaxial Power Systems RFG 050-13 - S/N 1758-1		RF-GENERATOR				user YX
<input type="checkbox"/> 2024-04-23	Dressler CESAR 133 - S/N 613000000061		RF-GENERATOR				user ZX
<input type="checkbox"/> 2024-04-23	Sunon DP201A Fan P/N 2123HST.GN		DEVICES				user ZZ
<input type="checkbox"/> 2024-04-18	Overview RF-Cable RG58		RF-CABLE				user XX
<input type="checkbox"/> 2024-04-05	IDS U3-3560XCP-C-HQ		CAMERAS				user XZ
<input type="checkbox"/> 2024-04-05	Telecentric Objective RCP2		OPTICAL DEVICES				user XX

Structure in eLabFTW – Resources

– an example of the Experimental Plasma Physics Group Kiel

“Resources” can be sorted in “Categories”

e.g.:


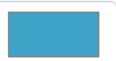

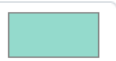




Structure in eLabFTW – Resources

– an example of the Experimental Plasma Physics Group Kiel

“Resources” can have a “Status”

e.g.:

Name	Color	Name	Color
⋮ working		⋮ empty	
Name	Color	Name	Color
⋮ broken		⋮ no longer available	
Name	Color	Name	Color
⋮ in repair		⋮ delete me!	










Structure in eLabFTW – Resources

– an example of the Experimental Plasma Physics Group Kiel

Large benefit compared to paper lab books:

“Resources” can be linked in “Experiments”

▼ LINKED RESOURCES

-  **DEVICES** Keithley DMM6500 - 1
-  **HEATING** Lauda Ecoline E203 Heating Circulator Thermostat
-  **MATCHBOX** Barthel Matching Cube i-300
-  **OPTICAL FIBER** OceanOptics OpticalFiber OOS-006794-01
-  **OPTICAL SPECTROMETER** OceanInsight Spectrometer HR-4XR300-5
-  **OSCILLOSCOPE** Tektronix TDS 2024 - S/N C031440
-  **PRECURSOR** Hexamethyldisilane (HMDS), abcr - 97%
-  **PROJECT** VUV-Photoionization Chamber
-  **RF-GENERATOR** RF-Generator Coaxial Power Systems RFG 300-13 - S/N 4020-1

Structure in eLabFTW – Resources

– an example of the Experimental Plasma Physics Group Kiel

Example of “Resources”

- Attach manuals, calibration sheets, ...
- Find experiments that used the device before
- Log maintenance, calibration, ...

Started on 2024-01-17

OceanInsight Spectrometer HR-4XR300-5

Team: Physics_AG-Exp
Category: OPTICAL SPECTROMETER
Status: WORKING
Tags: OES

Visibility: Only owner and admins
Can write: Only owner and admins

MAIN TEXT

Spectrometer	OceanInsight Spectrometer HR-4XR300-5
Manufacturer	OceanInsight
Model	HR-4XR
Serial	HR400421
Wavelength Range	220 - 1100 nm
Resolution (FWHM)	~0.5 - 0.6 nm
Entrance Slit	5 µm
Grating	HC1-300 Line Composite Blaze
Integration Time	3.8 ms - 10 s
Calibration Due	2024-10-24
Inventory No.	1064 3891

Relative calibration log:

date	user	comments
2024-01-30	XX	see attached file "Rel_Cal_20240130.pdf" and "RelCalibration_HR4D1286.dat"

Sample management using eLabFTW

– an example of the Experimental Plasma Physics Group Kiel

- **Samples**, e.g. created by thin-film deposition
- **Resource database entry** with important sample specifications in a sortable table
- **Direct linking** of experiments of sample production, analysis and data evaluation

Sample management using eLabFTW

– an example of the Experimental Plasma Physics Group Kiel

- **Resource category:** sample
- **Resource entry:** each sample series gets one entry



Started on 2024-01-15

Thin Film Deposition HMDS - Series HMDS_S00X

 Team Physics_AG-Exp

 Category **SAMPLES**

Status NOT SET

 Tags **atmospheric pressure plasma** **Film Deposition** **VUV**

Sample management using eLabFTW

– an example of the Experimental Plasma Physics Group Kiel

- General description of the **sample series**: setup, routine, etc.

▼ MAIN TEXT

Sample series HMDS_S00X: thin film deposition with [Precursor - Hexamethyldisilane \(HMDS\)](#), [abcr - 97%](#) on silicon wafer, using the [Experimental Setup - VUV-Photoionization Chamber](#), following [Routine - Thin Film Deposition with HMDS](#)

Sample management using eLabFTW

– an example of the Experimental Plasma Physics Group Kiel

- General description of the **sample series**: setup, routine, etc.
- Table entries:
 - General entries: sample ID (linking production experiment), date, produced by, comments, ...

sample ID	date	produced by
HMDS_S001	2024-01-17	dummy user
HMDS_S002	2024-01-18	dummy user
HMDS_S003	2024-01-22	dummy user
HMDS_S004	2024-01-24	dummy user
HMDS_S005	2024-01-24	dummy user

Sample management using eLabFTW

– an example of the Experimental Plasma Physics Group Kiel

- General description of the **sample series**: setup, routine, etc.
- Table entries:
 - General entries: sample ID (linking production experiment), date, produced by, comments, ...
 - Sample series specific entries: gases, voltages, treatment time

gases used	HMDS amount in ppm	applied voltage in V_{RMS}	treatment time in min
He	2000	460	90
He	500	460	90
He	500	460	90
He	100	460	90
He + 1000ppm O_2	500	460	90

Sample management using eLabFTW

– an example of the Experimental Plasma Physics Group Kiel

- General description of the **sample series**: setup, routine, etc.
- Table entries:
 - General entries: sample ID (linking production experiment), date, produced by, comments, ...
 - Sample series specific entries: gases, voltages, treatment time
 - Further sample analysis: linking experiments and evaluation

further analysis	data evaluation	
FTIR - HMDS_S001-S002 and Profilometry - HMDS_S001-S002	evaluation - FTIR - HMDS_S001-S006 and evaluation - Profilometry - HMDS_S001-S006	i
FTIR - HMDS_S001-S002 and Profilometry - HMDS_S001-S002	evaluation - FTIR - HMDS_S001-S006 and evaluation - Profilometry - HMDS_S001-S006	ic
FTIR - HMDS_S001-S006 and Profilometry - HMDS_S003-S006	evaluation - FTIR - HMDS_S001-S006 and evaluation - Profilometry - HMDS_S001-S006	n

Sample management using eLabFTW

– an example of the Experimental Plasma Physics Group Kiel

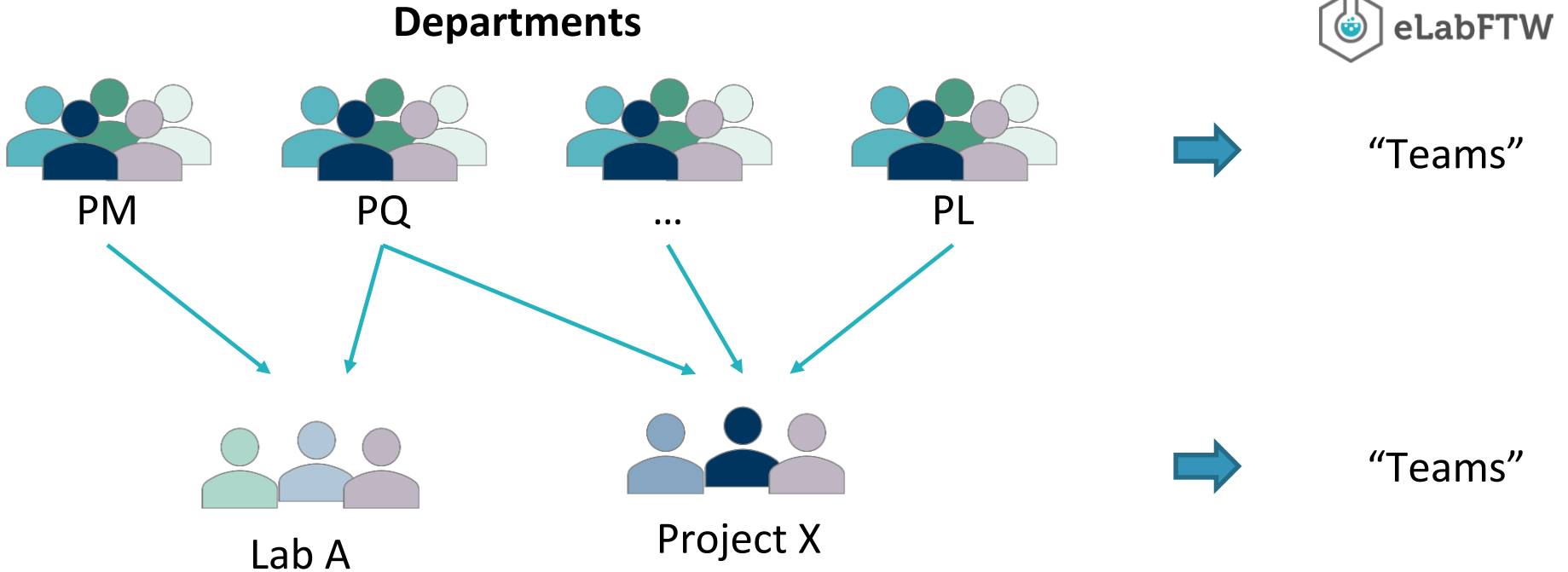
▼ MAIN TEXT

Sample series HMDS_S00X: thin film deposition with Precursor - Hexamethyldisilane (HMDS), abcr - 97% on silicon wafer, using the Experimental Setup - VUV-Photoionization Chamber, following Routine - Thin Film Deposition with HMDS

sample ID	date	produced by	gases used	HMDS amount in ppm	applied voltage in V _{RMS}	treatment time in min	further analysis	data evaluation	comment
HMDS_S001	2024-01-17	dummy user	He	2000	460	90	FTIR - HMDS_S001-S002 and Profilometry - HMDS_S001-S002	evaluation - FTIR - HMDS_S001-S006 and evaluation - Profilometry - HMDS_S001-S006	ion current oscillation, low FTIR signal, ¹
HMDS_S002	2024-01-18	dummy user	He	500	460	90	FTIR - HMDS_S001-S002 and Profilometry - HMDS_S001-S002	evaluation - FTIR - HMDS_S001-S006 and evaluation - Profilometry - HMDS_S001-S006	ion current oscillation, low FTIR signal, ¹
HMDS_S003	2024-01-22	dummy user	He	500	460	90	FTIR - HMDS_S001-S006 and Profilometry - HMDS_S003-S006	evaluation - FTIR - HMDS_S001-S006 and evaluation - Profilometry - HMDS_S001-S006	mixing nozzle inverted (see here), low FTIR signal, ¹
HMDS_S004	2024-01-24	dummy user	He	100	460	90	FTIR - HMDS_S001-S006 and Profilometry - HMDS_S003-S006	evaluation - FTIR - HMDS_S001-S006 and evaluation - Profilometry - HMDS_S001-S006	low FTIR signal, ¹
HMDS_S005	2024-01-24	dummy user	He + 1000ppm O ₂	500	460	90	FTIR - HMDS_S001-S006 and Profilometry - HMDS_S003-S006	evaluation - FTIR - HMDS_S001-S006 and evaluation - Profilometry - HMDS_S001-S006	low FTIR signal, ¹
HMDS_S006	2024-01-29	dummy user	He	500	525	180	FTIR - HMDS_S001-S006 and Profilometry - HMDS_S003-S006	evaluation - FTIR - HMDS_S001-S006 and evaluation - Profilometry - HMDS_S001-S006	strong FTIR signal, ¹
HMDS_S007	2024-01-30	dummy user	He + 1000ppm O ₂	500	525	180	FTIR - HMDS_S007-S008 and Profilometry - HMDS_S007-S008	evaluation - FTIR - HMDS_S007-S008 and evaluation - Profilometry - HMDS_S007-S008	strong FTIR signal, ¹
HMDS_S008	2024-01-30	dummy user	He + 5000ppm O ₂	500	525	180	FTIR - HMDS_S007-S008 and Profilometry - HMDS_S007-S008	evaluation - FTIR - HMDS_S007-S008 and evaluation - Profilometry - HMDS_S007-S008	strong FTIR signal, ¹

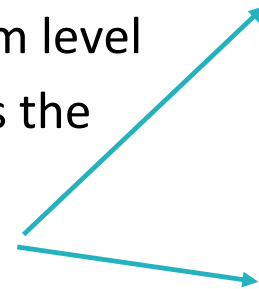
¹ calibration of PickUp Probe performed on 2024-01-15

Team-based structure of eLabFTW at INP



Self-organization by Teams

- Usage of “Groups” to restrict user access within a team
- More “Teams” means
 - more flexibility for users organized in smaller teams
 - larger organization effort, because “Categories”, “Resources” etc. are managed on the team level
- Each team has a “Team Admin” who organizes the “Categories”, “Resources”, “Templates” etc.
- Coarse suggestion for Resource Categories
- It is intended to feed Team-databases by centralized INP-wide resources → work in progress



Software

Model

Project

Lab Unit (Messplatz)

Device

Sample

Protocol

eLabFTW for Theoreticians

- Often not used to traditional lab books
- Individual habits in the documentation of model derivations, simulation studies, etc.
- Similar issues as in the labs when somebody leaves the group → models, codes, data etc. remain unused
- Special possibilities and relevant features, e.g. direct LaTeX support, linking of models, codes and data, programming interface for automation, integration with GitHub, GitLab, ...

Fluid-Poisson model for non-thermal plasmas

TeamINP

Category MODEL

Status NOT SET

Tags Fluid-Poisson model

Visibility + Only owner

Can write + Only owner

MAIN TEXT

General model equations

Continuity equations for all species densities n_j

$$\frac{\partial n_j}{\partial t} + \frac{\partial \Gamma_j}{\partial z} = S_j$$

Drift-diffusion fluxes Γ_j for all species

$$\Gamma_j = \text{sign}(Z_j) b_j E n_j - D_j \frac{\partial n_j}{\partial z}$$

Balance equation for electron energy density $n_e = n_e u_e$, u_e is the mean electron energy

$$\frac{\partial n_e}{\partial t} + \frac{\partial \Gamma_e}{\partial z} = -e_0 \Gamma_e E + S_e$$

Electron energy flux Γ_e

$$\Gamma_e = -\frac{5}{3} b_e E n_e - \frac{5}{3} D_e \frac{\partial n_e}{\partial z}$$

Poisson equation for potential ϕ , $E = -\frac{\partial \phi}{\partial z}$ is the electric field

$$\epsilon_0 \frac{\partial^2 \phi}{\partial z^2} = e_0 (n_{\text{ion}} - n_e)$$

Here, ϵ_0 is the vacuum permittivity, e_0 the elementary charge, D_j the diffusion coefficients, b_j mobilities and S_j source terms calculated according to the reaction kinetic model as

eLabFTW for Theoreticians

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Fluid-Poisson model for non-thermal plasmas

Influence of applied voltage in abnormal glow discharge

TeamINP

Category NOT SET

Status RUNNING

Tags Ar glow discharge parametric study

Visibility + Only owner

Can write + Only owner

MAIN TEXT

This parametric study investigates the influence of the applied voltage on an abnormal glow discharge in argon.

Used Model: [Model - Fluid-Poisson model for non-thermal plasmas](#)

Simulation tool: [Software - FEDM v1.0.0](#)

Results: [/data/becker/20240514_Ar-glow-study](#)

Unique eLabID: 20240513-6bebe922d172c2e093037d133812705d89c4f263
Last modified on 2024-05-13 23:18:03

LINKED RESOURCES

[MODEL](#) Fluid-Poisson model for non-thermal plasmas

[SOFTWARE](#) FEDM v1.0.0

Here, ϵ_0 is the vacuum permittivity, e_0 the elementary charge, D_j the diffusion coefficients, b_j mobilities and S_j source terms calculated according to the reaction kinetic model as