

April 17th, 2024

Bradlee Rothwell

HPC Website Developer
and System Administrator

Overview of the Nuclear Research Data System (NRDS)

What is NRDS?

- Place for data to be:
 - Publicly available
 - FpAIRe
 - Findability
 - Peekable
 - Accessibility
 - Interoperable
 - Stored close to HPC systems
 - Reusable
 - Extensible
- Funded by the Nuclear Science User Facilities

The screenshot shows the NRDS website with a dark blue header containing the logo and navigation links. The main content area features a 'Welcome to NRDS' section with a 3D model of an Advanced Test Reactor. To the right is a search bar with the text 'E.g. environment' and a 'Popular tags' section. Below these are two data cards: 'Current AI Analysis Features' and 'Idaho National Laboratory' with details on NSUF Core Hours and 20-4201 Reports. The footer includes 'About CKAN', 'Powered by ckan', and a language dropdown menu.

Publicly Available Data

- Data co-located with projects
- Easy to find via search
- Traceable

The screenshot shows the NRDS website interface. At the top, the header includes the NRDS logo and navigation links for Datasets, Organizations, Projects, and About. A search bar is present on the right. The main content area displays search results for the project 'NSUF 15-558: Proton Irradiations of Alloys Fabricated by Powder Metallurgy and Hot Isostatic Pressing'. It shows 3 datasets found, with a 'Relevance' sorting option. The datasets listed are 'PM-HIP Mechanical Data Archive - Tensile', 'PM-HIP Mechanical Data Archive - Nanoindentation', and 'PM-HIP Mechanical Data Archive - Fractography'. Each dataset entry includes a brief description and available file formats like CSV, JPEG, application/pdf, TXT, and image/png.

The screenshot shows the NRDS website interface for a search query related to 'Focused Ion Beam Tomography of Alloy 617 Corroded in Molten Chloride Salt'. The header includes the NRDS logo and navigation links. The main content area displays search results for 25 datasets found, with a 'Relevance' sorting option. The datasets listed include 'Focused Ion Beam Tomography of Alloy 617 Corroded in Molten Chloride Salt - Setup Images', 'Focused Ion Beam Tomography of Alloy 617 Corroded in Molten Chloride Salt - Electron Backscatter Diffraction with Energy-Dispersive X-ray Spectroscopy - GIF Format', 'Focused Ion Beam Tomography of Alloy 617 Corroded in Molten Chloride Salt - Electron Backscatter Diffraction with Energy-Dispersive X-ray Spectroscopy - Video', and 'Focused Ion Beam Tomography of Alloy 617 Corroded in Molten Chloride Salt - Electron Backscatter Diffraction with Energy-Dispersive X-ray Spectroscopy - Tungsten'. Each dataset entry includes a brief description and available file formats like GIF, PNG, and TIFF.

Dataset Flow



NRDS

- License
- Type of data
- Author
- OSTI Link
- DOI Link

Additional Info

Field	Value
Author	Trishelle Copeland-Johnson
Last Updated	February 27, 2024, 2:04 PM (UTC-07:00)
Created	February 7, 2024, 10:31 AM (UTC-07:00)
OSTI	
DOI Link	https://doi.org/10.48806/2287679
Instrument	FEI G4 Helios Hydra Plasma-FIB
Publication	Copeland-Johnson TM, Murray DJ, Cao G and He L (2022) Assessing the interfacial corrosion mechanism of Inconel 617 in chloride molten salt corrosion using multi-modal advanced characterization techniques. Front. Nucl. Eng. 1:1049693. doi: 10.3389/fnucn.2022.1049693
Slice Offset	100 nm
Statement of Credit	"Focused ion beam tomography of Alloy 617 corroded in molten chloride salt" by Trishelle Copeland-Johnson and Daniel J. J. Murray is licensed under CC BY 4.0 for distribution.



NSUF 15-8242: Irradiation Influence on Alloys Fabricated by Powder Metallurgy and Hot Isostatic Pressing for Nuclear Applications)

Manufacturing processes have considerable influence over the safety and integrity of nuclear reactor vessels and internal components. Established processes such as casting, plate rolling-and-welding, forging, drawing, and extrusion, have been used to fabricate structural and pressure-retaining materials used in the nuclear power industry for the past 60 years. However, issues of weldability, inspectability, and casting defects such as porosity, continue to challenge the manufacture of reactor vessels and internals, enhancing their susceptibility to degradation and failure. Reactor vessels and internals are subject to harsh service environments that combine high radiation fluence, high temperature, and mechanical stress, which accelerate material degradation. The most extreme degradation often occurs in weldments and poor-quality components that were inadequately inspected. Advanced reactor designs and life extensions to the existing fleet of light water reactors (LWRs) will further exacerbate materials degradation issues by increasing the duty on reactor internals. Thus, developing reliable manufacturing processes to ensure high-quality weldments and inspections can be performed, is of great importance to the continued safety and operation of nuclear power plants. Recently, alloys produced by powder metallurgy and hot isostatic pressing (PM-HIP) have successfully been developed and introduced for structural pressure-retaining applications in the electric power industry [1]. These PM-HIP components exhibit excellent structural uniformity, no chemical segregation, superior mechanical properties, and enhanced weldability. In addition, PM-HIP components are produced near-net shape, which offers the distinct advantages of minimizing machining and enhancing the ease of component inspectability. Components fabricated by PM-HIP are also lower-cost and higher quality than those fabricated by casting, owing to their reduced porosity and weight. Because of their exceptional properties, PM-HIP alloys have attracted the interest of the nuclear power industry as potential structural materials for LWRs, advanced light water reactors (ALWRs), small modular reactors (SMRs), and advanced (e.g. Generation IV) reactors. But little is known about the irradiation response of PM-HIP alloys, and even more critically, existing data do not elucidate the differences in irradiation response between PM-HIP and conventional alloys. This project seeks to understand these irradiation effects through a systematic neutron irradiation campaign and post-irradiation microstructural and mechanical assessments. The objective of this project is to assess the viability of using alloys manufactured by PMHIP for nuclear reactor internals, in order to enhance the quality, weldability, and inspectability of these components. Improving the manufacturing processes for reactor internals will have crosscutting impact across all DOE-NE programs. This project will compare the irradiation response of six PM-HIP and conventionally manufactured alloys commonly used in LWR internals, or which are candidates for ALWR and SMR internals, having relevance to all DOE-NE base programs. This project will also supplement ongoing DOE Nuclear Energy Enabling Technologies (DOE-NEET) research on Innovative Manufacturing Process for Nuclear Power Plant Components via Powder Metallurgy and Hot Isostatic Processing Methods (DE-NE000054). Several original equipment manufacturers (OEMs) are exploring PM-HIP techniques for reactor internals. Along with additional industry and university partners, they have provided input to the proposed workscope and will serve on the Industrial Advisory Board for this project. Furthermore, use of PM-HIP technology will help re-establish nuclear manufacturing in the United States. Book / Journal Publications "In situ tensile study of PM-HIP and cast 316L stainless steel and Inconel 625 alloys with high energy diffraction microscopy" Janelle Wharry, Donna Guillen, Elizabeth Getto, Darren Pagan, Materials Science & Engineering A 738 2018 380-388

[read more](#)

Followers **0** Datasets **5**

NSUF 15-8242: Irradiation Influence on Alloys Fabricated by Powder Metallurgy and Hot Isostatic Pressing for Nuclear Applications)

Manufacturing processes have considerable influence over the safety and integrity of nuclear reactor vessels and internal components. Established processes such as casting, plate rolling-and-welding, forging, drawing, and extrusion, have been used to fabricate structural and pressure-retaining materials used in the nuclear power industry for the past 60 years. However, issues of weldability, inspectability, and casting defects such as porosity, continue to challenge the manufacture of reactor vessels and internals, enhancing their susceptibility to degradation and failure. Reactor vessels and internals are subject to harsh service environments that combine high radiation fluence, high temperature, and mechanical stress, which accelerate material degradation. The most extreme degradation often occurs in weldments and poor-quality components that were inadequately inspected. Advanced reactor designs and life extensions to the existing fleet of light water reactors (LWRs) will further exacerbate materials degradation issues by increasing the duty on reactor internals. Thus, developing reliable manufacturing processes to ensure high-quality weldments and inspections can be performed, is of great importance to the continued safety and operation of nuclear power plants. Recently, alloys produced by powder metallurgy and hot isostatic pressing (PM-HIP) have successfully been developed and introduced for structural pressure-retaining applications in the electric power industry [1]. These PM-HIP components exhibit excellent structural uniformity, no chemical segregation, superior mechanical properties, and enhanced weldability. In addition, PM-HIP components are produced near-net shape, which offers the distinct advantages of minimizing machining and enhancing the ease of component inspectability. Components fabricated by PM-HIP are also lower-cost and higher quality than those fabricated by casting, owing to their reduced porosity and weight. Because of their exceptional properties, PM-HIP alloys have attracted the interest of the nuclear power industry as potential structural materials for LWRs, advanced light water reactors (ALWRs), small modular reactors (SMRs), and advanced (e.g. Generation IV) reactors. But little is known about the irradiation response of PM-HIP alloys, and even more critically, existing data do not elucidate the differences in irradiation response between PM-HIP and conventional alloys. This project seeks to understand these irradiation effects through a systematic neutron irradiation campaign and post-irradiation microstructural and mechanical assessments. The objective of this project is to assess the viability of using alloys manufactured by PMHIP for nuclear reactor internals, in order to enhance the quality, weldability, and inspectability of these components. Improving the manufacturing processes for reactor internals will have crosscutting impact across all DOE-NE programs. This project will compare the irradiation response of six PM-HIP and conventionally manufactured alloys commonly used in LWR internals, or which are candidates for ALWR and SMR internals, having relevance to all DOE-NE base programs. This project will also supplement ongoing DOE Nuclear Energy Enabling Technologies (DOE-NEET) research on Innovative Manufacturing Process for Nuclear Power Plant Components via Powder Metallurgy and Hot Isostatic Processing Methods (DE-NE000054). Several original equipment manufacturers (OEMs) are exploring PM-HIP techniques for reactor internals. Along with additional industry and university partners, they have provided input to the proposed workscope and will serve on the Industrial Advisory Board for this project. Furthermore, use of PM-HIP technology will help re-establish nuclear manufacturing in the United States. Book / Journal Publications "In situ tensile study of PM-HIP and cast 316L stainless steel and Inconel 625 alloys with high energy diffraction microscopy" Janelle Wharry, Donna Guillen, Elizabeth Getto, Darren Pagan, Materials Science & Engineering A 738 2018 380-388

"Comparative Thermal Aging Effects on PM-HIP and Forged Inconel 690" Keyou Mao, David Gandy, Janelle Wharry, JOM 70 2018 2218-2223 Link

"Thermal Aging and the Hall-Petch Relationship of PM-HIP and Wrought Alloy 625" Janelle Wharry, Keyou Mao, David Gandy, Elizabeth Getto, JOM 71 2019 2837 Link

"Comparison of ion irradiation effects in PM-HIP and forged alloy 625" Caleb Clement, Yangyang Zhao, Patrick Warren, Xiang Liu, Sichuang Xue, David Gandy, Janelle Wharry, Journal of Nuclear Materials 558 2022 Link

"Experiment design for the neutron irradiation of PM-HIP alloys for nuclear reactors" Donna Guillen, Janelle Wharry, Gregory Housley, Cody Hale, Jason Brookman, David Gandy, Nuclear Engineering and Design 402 2023 Link

Conference Publications "Neutron Irradiation of Nuclear Structural Materials Fabricated by Powder Metallurgy with Hot Isostatic Pressing" David Gandy, Donna Guillen, Janelle Wharry, 2017 ANS Annual Meeting [unknown]

Additional Info

Field	Value
PI	Janelle Wharry

FpAIRe Data

- Findability
- Peekable
- Accessibility
- Interoperable
- Reusable
- Extensible



Findability

- Search features
- DOI Link
- Organized by projects
- Tags
- OSTI Link

The screenshot displays the NRDS (Nuclear Research Data System) website. The header includes the NRDS logo and navigation links for Datasets, Organizations, Projects, and About, along with a search bar. The main content area shows a search for datasets, resulting in 35 datasets found, ordered by Relevance. A sidebar on the left provides filters for Organizations (NSUF - 32, Idaho National Laboratory - 3), Projects (NSUF 15-8242:... - 5), Tags (SOW - 7, report - 2), and Formats (PDF - 13, DOCX - 11, JPEG - 2, TXT - 2, application/rtf - 1, CSV - 1, image/bmp - 1). The first dataset listed is 'NSUF Core Hours'.

NRDS Nuclear Research Data System

[Datasets](#) [Organizations](#) [Projects](#) [About](#) Search

Home / Datasets

Organizations

- NSUF - 32
- Idaho National Laboratory - 3

Projects

- NSUF 15-8242:... - 5

Search datasets...

35 datasets found Order by: Relevance

NSUF Core Hours

Tags

- SOW - 7
- report - 2

Formats

- PDF - 13
- DOCX - 11
- JPEG - 2
- TXT - 2
- application/rtf - 1
- CSV - 1
- image/bmp - 1

Peekable

Organizations / NSUF / 15-8242 Reports / 15-8242 Experiment...

15-8242 Experiment Execution Plan.pdf

Download

URL: <https://nrrds.hpc.inl.gov/dataset/de8a2581-e6fd-4469-97c4-62398a00f5ef/resource/9fff73f-f5e9-4fe3-a07a-a6f5090fa2fa/download/15-8242-experiment-execution-plan.pdf>

Dataset description:

Source: 15-8242 Reports

PDF

Fullscreen Embed

Nuclear Material Experiment Execution Plan

Document ID: PLN-5248
Revision ID: 1
Effective Date: 05/08/17

INL
Idaho National Laboratory

The INL is a U.S. Department of Energy National Laboratory operated by Battelle Energy Alliance.

Organizations / NSUF / PM-HIP Mechanical Data... / 3461_bulk_ReadMe.txt

3461_bulk_ReadMe.txt

Download

URL: https://nrrds.hpc.inl.gov/dataset/af2613f7-48ef-4b2f-ad1d-c48e5af5001d/resource/4dcd9c2-8ad9-49ba-b99e-4b609476fa03/download/3461_bulk_readme.txt

Data taken from: `projects/nrrds_nsf_data/janelle/pm-hip_mechanical_data_archive/Nanoindentation/SA508-P_300C_IDPA_(ID-104)/3461_bulk_ReadMe.txt`

Text

Fullscreen Embed

Number of Data Points = 30

File	hc (nm)	Pmax (µN)	S (µN/m)	A (nm ²)	hmax (nm)	heff (nm)	Er (GPa)	H (GPa)	A	hf (nm)	m	X (µm)	Y (µm)	Drift (nm/s)
KGT3461_Position_6_00000_LC.hys	186	352427	7999.345128	195.569521	2135167.198090	217.286948	217.029542	118.582351	3.746472					
KGT3461_Position_6_00001_LC.hys	216	181648	7999.335048	189.506428	2944021.355574	248.013131	247.840211	97.856189	2.717146					
KGT3461_Position_6_00002_LC.hys	239	228699	7999.537519	191.102703	3649288.803715	270.707161	270.623615	88.633427	2.192081					
KGT3461_Position_6_00003_LC.hys	219	663917	7999.185504	202.991019	2928966.240246	245.307858	245.218865	105.088325	2.731061					
KGT3461_Position_6_00004_LC.hys	204	937960	7999.414096	211.826411	2625569.843466	233.608065	233.208065	115.824783	3.046711					
KGT3461_Position_6_00005_LC.hys	186	624855	7999.512054	199.766232	2142004.078776	216.583293	216.658129	120.933538	3.734592					
KGT3461_Position_6_00006_LC.hys	211	841768	7999.302011	205.344409	2818913.117213	241.091230	241.059421	108.361964	2.837726					
KGT3461_Position_6_00007_LC.hys	224	588991	7999.246381	200.459023	3193392.754052	254.911560	254.517483	99.388073	2.504937					
KGT3461_Position_6_00008_LC.hys	221	088674	7999.284005	205.681786	3088453.168217	250.423935	250.257339	103.695558	2.590062					
KGT3461_Position_6_00009_LC.hys	211	187040	7999.663196	204.999746	2800254.688715	240.664924	240.454137	108.539892	2.856763					
KGT3461_Position_6_00010_LC.hys	212	103648	7999.704681	211.577530	2826392.053800	240.613753	240.461000	111.503415	2.830359					
KGT3461_Position_6_00011_LC.hys	226	617429	7999.287512	190.575558	3254029.131602	256.260673	258.698201	93.590390	2.457592					
KGT3461_Position_6_00012_LC.hys	218	374017	7999.186803	199.587255	3008162.458443	248.504792	248.432998	101.956986	2.659160					
KGT3461_Position_6_00013_LC.hys	216	476518	7999.314426	197.139439	2952611.606149	246.995558	246.909230	101.649485	2.709234					
KGT3461_Position_6_00014_LC.hys	232	429113	7999.295550	201.177553	3434155.692825	262.425646	262.250860	96.104330	2.323334					
KGT3461_Position_6_00015_LC.hys	211	890243	7999.637778	206.193302	2820525.200479	241.176364	240.995833	108.778832	2.836223					
KGT3461_Position_6_00016_LC.hys	193	261007	7999.539772	217.100502	2311729.985657	221.175477	220.896386	126.510655	3.460413					
KGT3461_Position_6_00017_LC.hys	219	198629	7999.716532	203.754419	3032450.307674	248.731154	248.644800	103.668071	2.638037					
KGT3461_Position_6_00018_LC.hys	221	354560	7999.697965	218.024987	3116221.418578	250.299289	249.873303	109.252461	2.558903					
KGT3461_Position_6_00019_LC.hys	221	880398	7999.728956	215.210851	3112050.235890	249.848412	249.759088	108.087555	2.570565					
KGT3461_Position_6_00020_LC.hys	219	424135	7999.662785	216.999484	3039107.704040	247.351412	247.072804	110.286025	2.632241					
KGT3461_Position_6_00021_LC.hys	214	501490	7999.503084	208.015114	2895292.268826	243.640099	243.344845	108.313731	2.762962					
KGT3461_Position_6_00022_LC.hys	220	171925	7999.662698	209.534757	3061231.441439	249.004838	248.808318	106.096575	2.613127					
KGT3461_Position_6_00023_LC.hys	220	581918	7999.778890	209.433475	3073392.187061	249.372991	249.229842	105.845387	2.602915					
KGT3461_Position_6_00024_LC.hys	226	803704	7999.177881	210.295728	3266606.625533	255.476804	255.332022	103.184883	2.453279					
KGT3461_Position_6_00025_LC.hys	230	585908	7999.139969	216.293064	3376846.380938	258.593844	258.322951	104.285415	2.368820					
KGT3461_Position_6_00026_LC.hys	230	015633	7999.202616	209.506137	3359202.882720	258.818721	258.651557	101.277614	2.381280					
KGT3461_Position_6_00027_LC.hys	217	167725	7999.599558	212.057216	2972792.721634	245.734592	245.460959	108.969653	2.690938					
KGT3461_Position_6_00028_LC.hys	217	918352	7999.578696	216.041033	2994779.544184	246.100847	245.689392	110.608536	2.671174					
KGT3461_Position_6_00029_LC.hys	227	239048	7999.174941	207.990877	3273892.934739	236.222420	236.083492	101.846680	2.445322					

3461_bulk_ReadMe.txt

URL: https://nrrds.hpc.inl.gov/dataset/af2613f7-48ef-4b2f-ad1d-c48e5af5001d/resource/4dcd9c2-8ad9-49ba-b99e-4b609476fa03/download/3461_bulk_readme.txt

Resources

Field	Value
Data last updated	April 26, 2023
Metadata last updated	April 26, 2023
Created	April 26, 2023
Format	TXT
License	Creative Commons Attribution

Show more

Peekable

Home / Organizations / Idaho National Laboratory / NSUF Core Hours / NSUF core hours - no graph.xlsx

NSUF core hours - no graph.xlsx [Download](#) [Data API](#)

URL: <https://nrrds-demo.hpc.inl.gov/dataset/fea62c31-2531-437d-9f58-60026fde61d7/resource/185e9892-abc5-4ee0-afe0-0a5b21984551/download/nsuf-core-hours-no-graph.xlsx>

[Data Explorer](#) [Table](#) [Fullscreen](#) [Embed](#)

[Add Filter](#)

Grid Graph Map 18 records « 1 - 18 »

_id	None	Sawtooth	Lemhi	Falcon	Sum
1	Oct	397426...	221947...	19911 6...	639285...
2	Nov	528079...	158945...	1.0625	687026...
3	Dec	440035...	351548...	1508.0275	793092...
4	Jan	2126185...	460057...	1208.44...	2587451...
5	Feb	1936660...	326622.3	20730.8...	2284013...
6	Mar	1210220...	669166...	10781.0...	1890168...
7	Apr	1459759...	635491...	2088.18...	2097338...
8	May	936831...	447360...	42364.9...	1426556...
9	Jun	4155708...	404991...	486099...	5046800...
10	Jul	2385175...	853060...	4550.04...	3242785...
11	Aug	2210893...	106979...	10207.6...	2330081...
12	Sep	953328...	377995...	1632.12	1332955...
13					
14					
15					
16					
17					
18					

Q Search data... Go » Filters

NSUF core hours - no graph.xlsx

URL: <https://nrrds-demo.hpc.inl.gov/dataset/fea62c31-2531-437d-9f58-60026fde61d7/resource/185e9892-abc5-4ee0-afe0-0a5b21984551/download/nsuf-core-hours-no-graph.xlsx>

[Resources](#)

Data Dictionary

Column	Type	Label	Description
None	text		
Sawtooth	text		
Lemhi	text		
Falcon	text		

Home / Organizations / Idaho National Laboratory / NSUF Core Hours / NSUF core hours - no graph.xlsx

NSUF core hours - no graph.xlsx [Download](#) [Data API](#)

URL: <https://nrrds-demo.hpc.inl.gov/dataset/fea62c31-2531-437d-9f58-60026fde61d7/resource/185e9892-abc5-4ee0-afe0-0a5b21984551/download/nsuf-core-hours-no-graph.xlsx>

[Data Explorer](#) [Table](#) [Fullscreen](#) [Embed](#)

[Add Filter](#)

Grid Graph Map 18 records « 1 - 18 »

Q Search data... Go » Filters

Graph Type

Lines

Group Column (Axis 1)

Sawtooth

Series A (Axis 2) [Remove]


Sawtooth

Add Series

NSUF




Accessibility


- Anyone can view data
- No password required
- DOIs created upon upload
- Creative Commons Attribution
 - Open sourced, publicly available data

304-F_400C_3DPA_ID-723_posttest_01.JPG  [Download](#)

URL: https://nrd5-demo.hpc.inl.gov/dataset/732840ab-eaf1-4743-a6d9-a2b3efeb05f4/resource/dbb67bcc-5f85-44e7-9fac-0f125d1d0d80/download/304-f_400c_3dpa_id-723_posttest_01.JPG

Data taken from: /projects/nrd5_nsuf_data/janelle/pm-hip_mechanical_data_archive/Tensile/PHOTOS/3DPA/304-F_400C_3DPA_ID-723_posttest_01.JPG



Enhancing Interoperability NRDS Portal

Place for PIs and researchers to upload and collaborate on datasets within their project before having them become public on NRDS

- Embargos will be enforced
- DOIs will be automatically created for each dataset
- Allows drag and drop for files
- The project PI and NSUF review team will both have to either approve or reject dataset before it is submitted to NRDS
- Timeline – Public by August 2024

NRDS Nuclear Research Data System Log out

Portal

Bradlee's Datasets Review Datasets

Filter by Status: **1** Adding, **0** Under Review, **1** Needs Revision, **1** Completed, **3** All Create New Dataset

Show 10 entries Search:

Title	Organization	Project	Embargo Date	Status	
20-19076 Reports	nsuf1	NSUF 20-4118		Needs Revision	Add Files
20-4118 Reports	nsuf1	NSUF 20-4118		Completed	View Files
Focused Ion Beam Tomography of Alloy 617 Corroded in Molten Chloride Salt - Setup Images	nsuf1	NSUF 19-1635	Fri, 07 Feb 2025 00:00:00 GMT	Adding	Add Files

Showing 1 to 3 of 3 entries Previous 1 Next

NRDS Nuclear Research Data System

NSUF 19-1635 > Focused Ion Beam Tomo... + New

Name	Size	Modified
Completion report RTE 4304.pdf	110 KB	9 months ago

1 file and 0 folders 110 KB

Deleted files 0 B used Files settings

<https://nrds-nextcloud.hpc.inl.gov/index.php>

Dataset Fields

Fields for uploading a dataset:

Field name	Explanation	Required?
Title	A descriptive title that the dataset will be released as on the main NRDS website.	Yes
Description	Some useful information about the data, similar to a project abstract.	Yes
Instruments	The device(s) used to collect/generate the data, including any model numbers.	No
Tags	Keywords that describe the dataset and will be able to be used as filters.	No
License	The copyright license this dataset will be released under.	Yes
Project Association	The project that this data was collected as part of and funded by.	Yes
Embargo Expiration	The date the data associated with this dataset will be released for the public.	No
Author(s)	The author(s) of the dataset to be listed on the main NRDS website.	No
Statement of Credit	The statement that others will use to give you credit for/cite your work.	Yes
Dataset DOI	If no DOI is entered, NRDS will automatically generate one and email it to you.	No

NRDS Nuclear Research Data System
Portal

Home / Create dataset

Create Dataset

Add Details

* Title:
Please use only alphanumeric characters with spaces/dashes/underscores for the title. It also cannot end with a space.
eg. A descriptive title

* Description:
eg. Some useful notes about the data

Instrument:
Instrument used to collect data

Tags:
Please separate tags with commas
eg. economy, mental health, government

License:
UK Open Government Licence (OGL)

NRDS Portal to NRDS

NRDS Nuclear Research Data System
Portal Log out

Home / Display Dataset

Tomography of Alloy 617 in NaCl-MgCl₂ - Scanning Electron Microscopy

Status: Completed

Uploaded On: 2024-02-27

Uploaded By: Bradlee

Description: Materials qualification of reactor structural materials is a critical step in rapid implementation of advanced nuclear reactor technologies, particularly to assess the corrosion performance in these designs

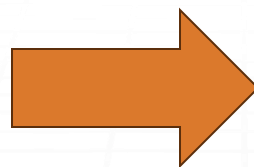
Instruments: FEI G4 Helios Hydra Plasma-FIB, FIBBY MCFIBFACE

Tags: corroded

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Organization: nsuf1

Project Association: NSUF 19-1635
PI: Xiang Liu



- Goes to NRDS after:
- ❑ Embargo date has past
 - ❑ PI has approved all data and information
 - ❑ NSUF review team has approved all data and information

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Home / Organizations / Idaho National Laboratory / Tomography of Alloy 617 in...

Organization: Idaho National Laboratory
There is no description for this organization

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Tomography of Alloy 617 in NaCl-MgCl₂ - Scanning Electron Microscopy

Materials qualification of reactor structural materials is a critical step in rapid implementation of advanced nuclear reactor technologies, particularly to assess the corrosion performance in these designs. Accelerated qualification of reactor structural materials requires incorporating powerful computational toolsets, such as phase field modelling in the Multiphysics Object-Oriented Simulation Environment (MOOSE) framework, to predict the evolution of structural materials due to corrosion. Accordingly, computational toolsets will require experimental data generated at appropriate length scales to validate accuracy. Focused ion beam (FIB) provides a high degree of control over manipulation of materials for analytical purposes, including capturing data on the evolution in the microstructure and elemental composition of materials at the mesoscale, an appropriate length scale for phase field modelling of intergranular diffusion phenomena using the MOOSE framework. For instance, the FEI Helios G4 UX dual beam plasma FIB microscope at the Irradiated Materials Characterization Laboratory (IMCL) is capable of backscatter diffraction (EBSD) and energy-dispersive x-ray spectroscopy (EDS) documenting the evolution in the microstructure and elemental composition, respectively. The Helios can perform EDS and EBSD three-dimensionally (3D) using tomography, which is then combined using different software packages to visualize 3D volumes correlating elemental composition to microstructural data. The purpose of this investigation was to develop a streamlined characterization and data processing workflow for 3D tomography studies on the FEI Helios G4 plasma FIB. The investigation is segmented into three parts: 1) Optimizing the data collection workflow, 2) identifying appropriate data processing and visualization software (i.e. DREAM.3D, MIPAR, and VGStudioMax), and 3) establishing an infrastructure for public release. The optimization of the data collection workflow is in collaboration with members of the U220 department to setup formal training on the tomography operation of the G4, through ThermoFisher Scientific, and exploring DREAM.3D, MIPAR, and VGStudioMax data processing/visualization software packages. VGStudioMax currently demonstrates the most promise for future use. Optimization of the data collection and processing workflow is still ongoing. A collaboration with INL High Performance Computing (HPC) established an open-source license for expediting the public release of FIB tomography datasets through HPC. FIB tomography data generated by the G4 will provide comprehensive data for validating 3D phase field mesoscale modelling tools within the MOOSE framework for accelerated qualification of reactor structural materials.

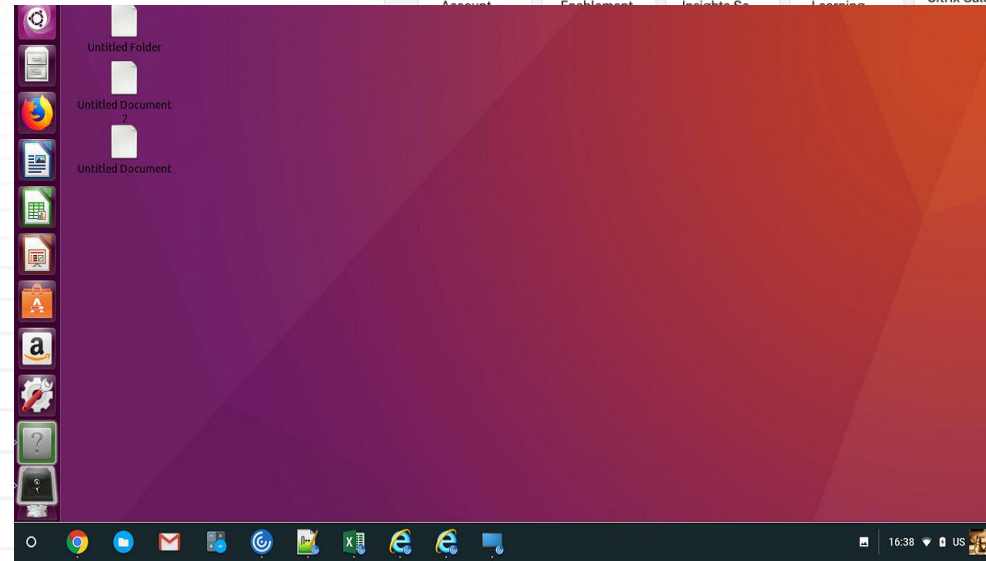
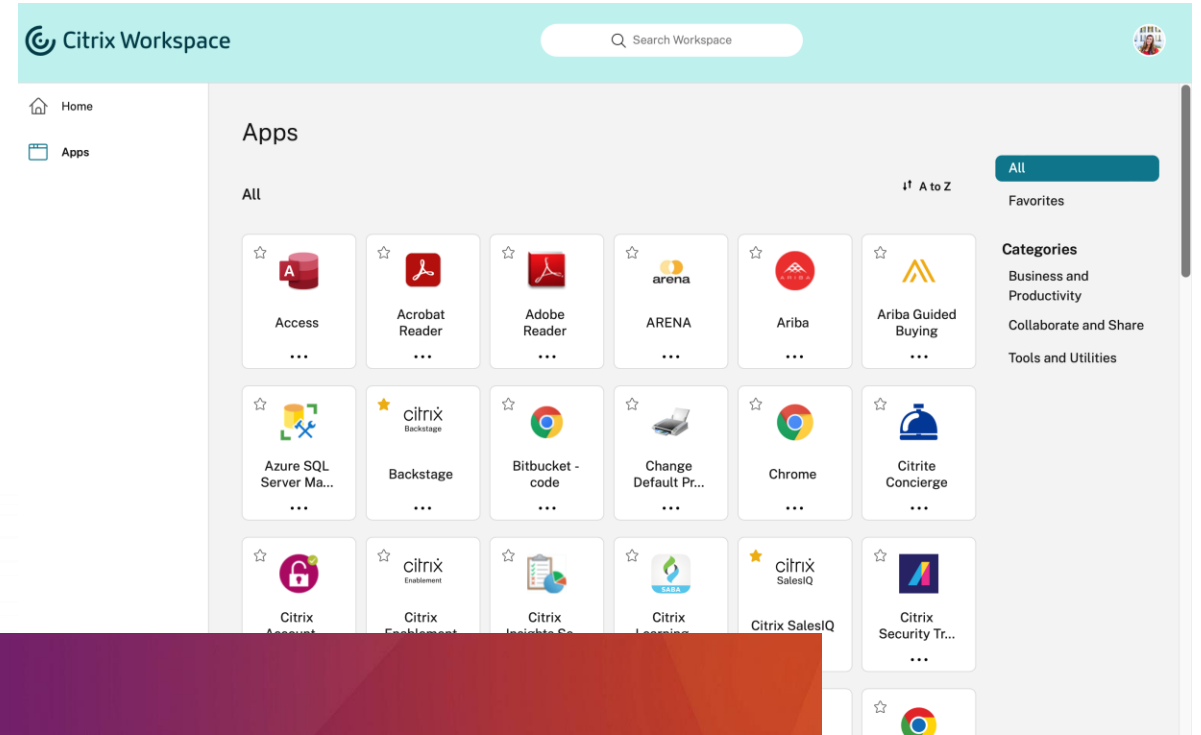
Data and Resources

Show 10 entries Filter resources:

Datatype	Name	Last Modified
img	SEM Image - Sicelimage - 001.png Data taken from: /rdm/world/copetm/A617_TEST0-7/Images/SEM Image/SEM Image - ...	February 14, 2024, 2:39 P (UTC-07:00)
img	SEM Image - Sicelimage - 001.tif Data taken from: /rdm/world/copetm/A617_TEST0-7/Images/SEM Image/SEM Image - ...	February 14, 2024, 2:39 P (UTC-07:00)

NRDS Portal Hypervisor

- Will allow HPC access via Citrix Hypervisor which will include:
 - Virtual Windows desktops
 - Direct access to GPUs
 - Access to run software such as Avizo and VGStudioMax
- All uploaded data by the user or the project the user is in will be available for use for that user
- Only users within the specific project can view or use the data for the project

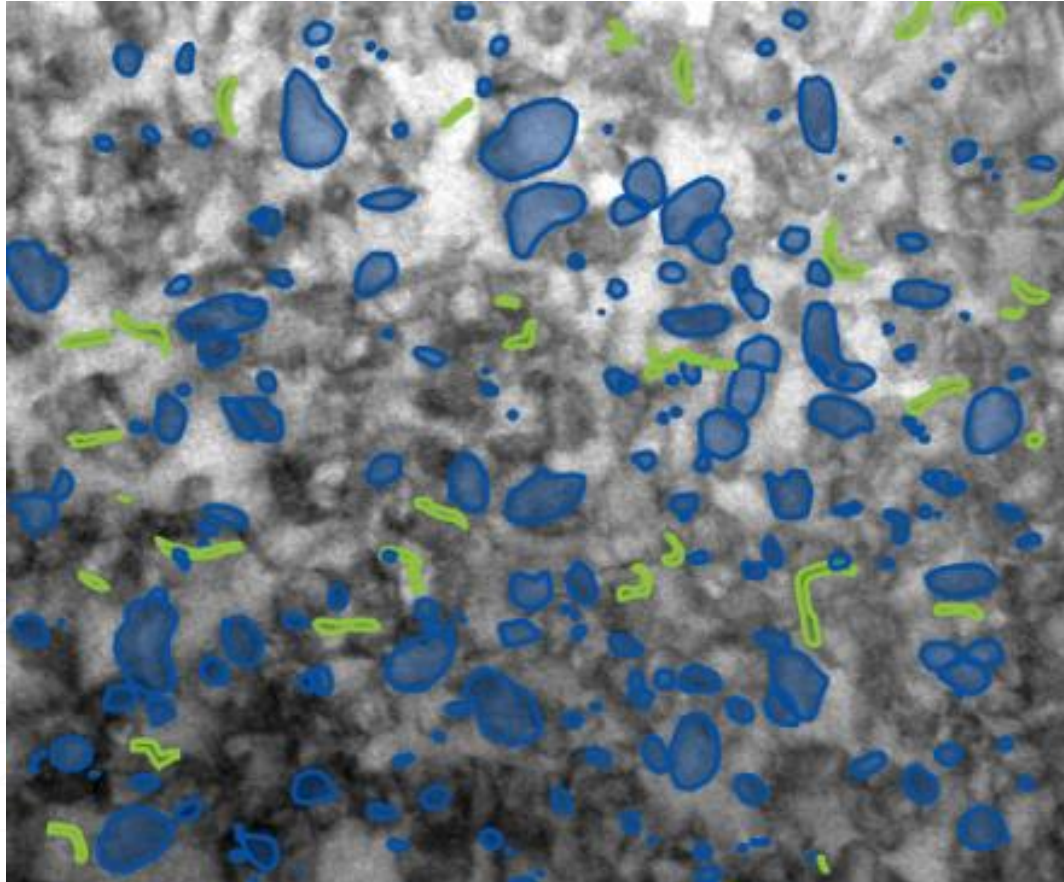


Reusable



- NRDS Storage will keep the data
 - 1.2 PB initially
- Stored in a non-proprietary format

Extensible



- Annotation will give data new life
 - AI Analysis
 - New discoveries

AI Analysis

- **Currently Available**
 - Super Resolution
 - Activity Detection
- **Coming Soon**
 - Anomaly Detection
 - Object Detection
 - Stitching



Super Resolution

Super Resolution

Low resolution to high resolution photo

Images will be deleted after one day of generation. Please make sure to download the image or else the image will have to be regenerated

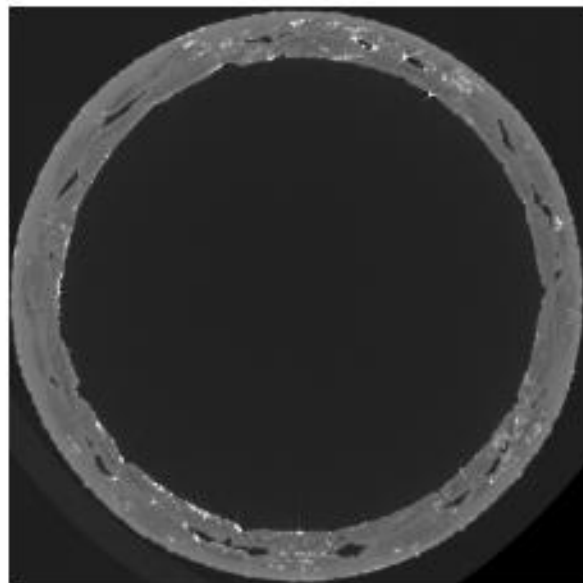
Upscale

Sharpen

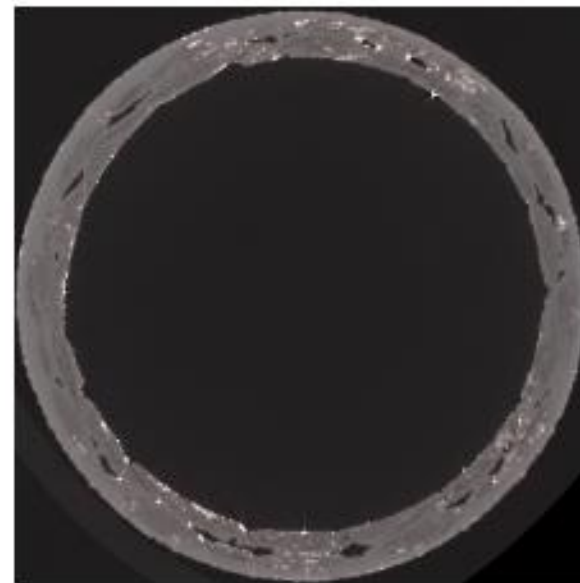
Compare Images

rot0625_low_res.png

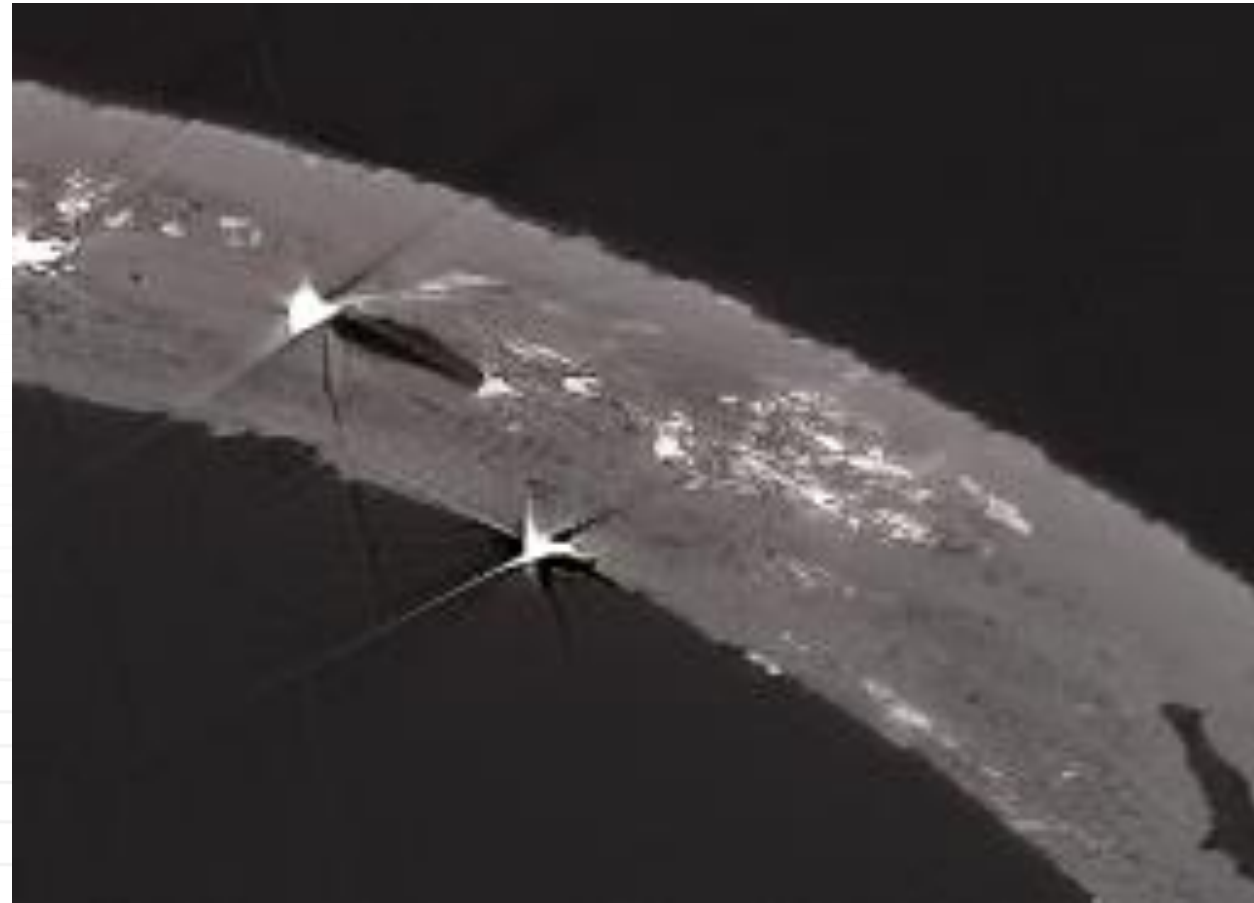
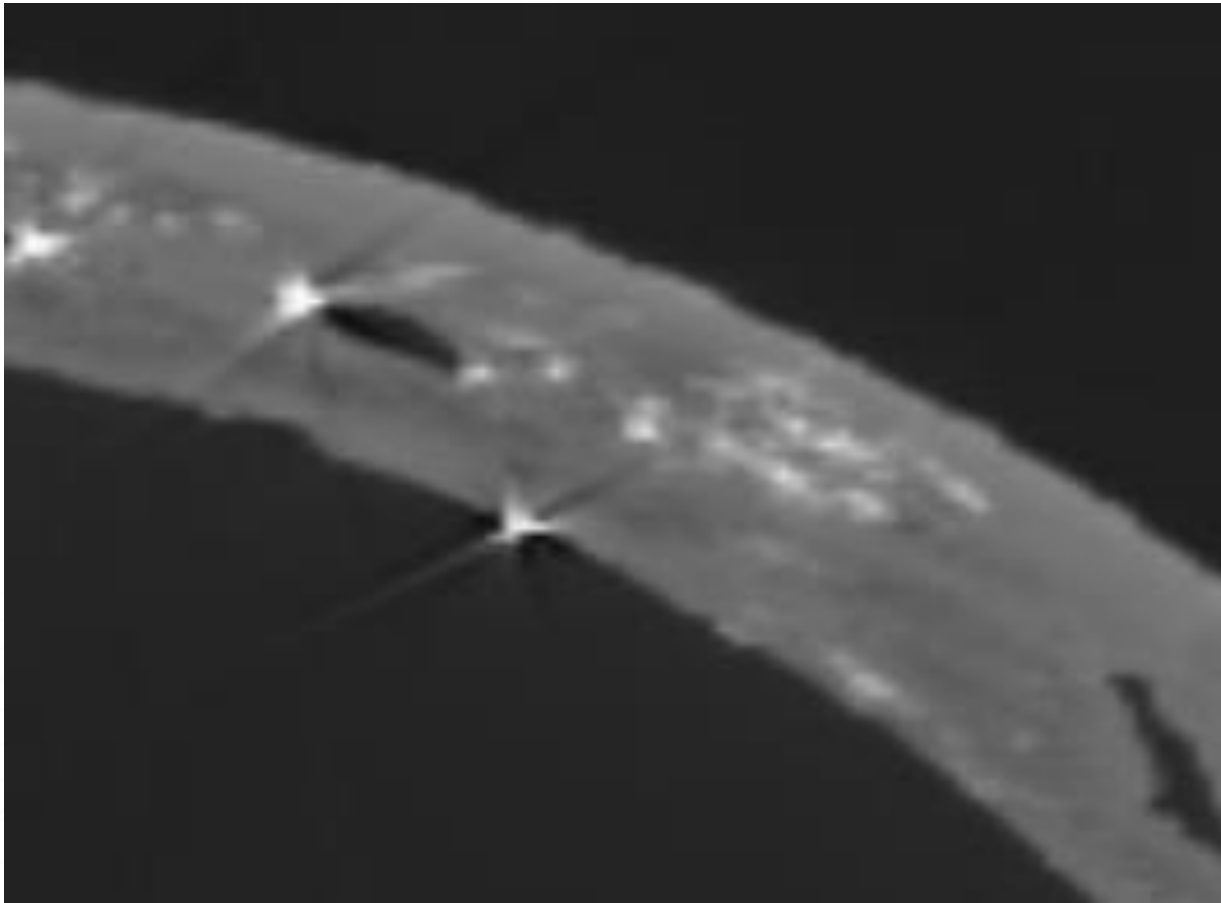
Original ▼



Upscaled ▼



Super Resolution



Activity Detection

Activity Detection

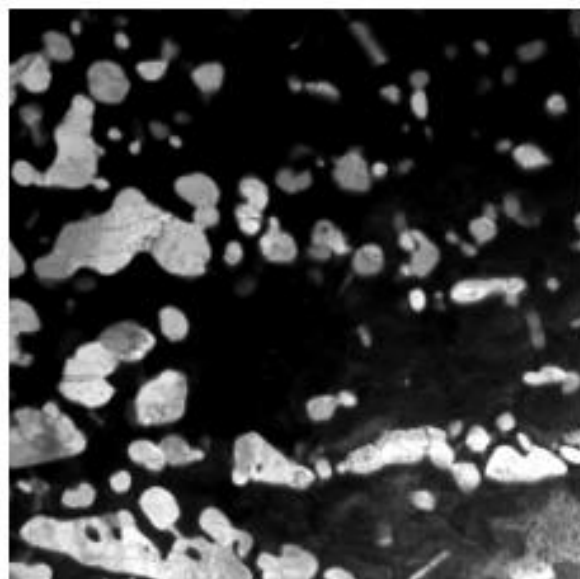
Activity is marked based on the previous 25 frames of a video

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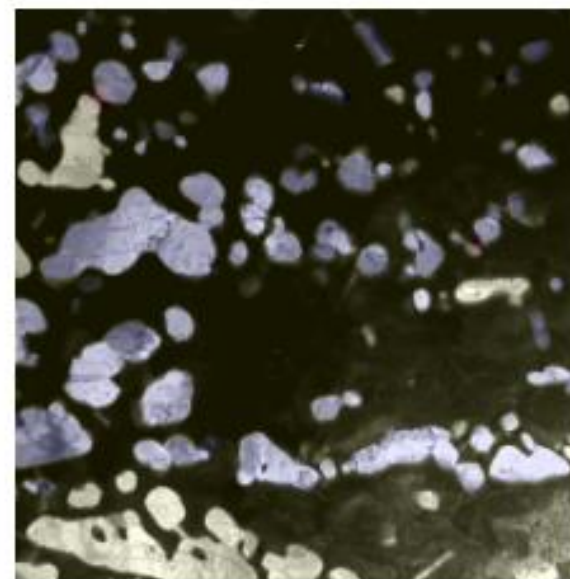
Detect

Compare Images

Original



Activity



Change

Merger

Capture

Formation

Unknown

NRDS

- Site that is a public science data gateway that will allow public data to be downloaded, previewed, or enhanced through AI
- FpAIRe data
 - Proprietary data
 - Embargo dates
- Data collection efforts are on going

<https://nrds.inl.gov/>



Questions?

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