

CAS IP Finder, powered by STN™  
**Coffee Lecture:**

# SEARCHING NUMERIC PROPERTIES WITH CAS NEWTON<sup>SM</sup>

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**CAS**

A division of the  
American Chemical Society



# The Numeric Property Search (NPS)

## Basic Facts

### Properties

59 chemical and physical properties are searchable

More than 20,000 unit variants are supported

Tolerances are also searchable

### Numeric Analyzer

English-language text fields - **TI**, **AB**, **CLMEN**

Exact values and ranges

### Databases

DWPI and additional full-text patent databases

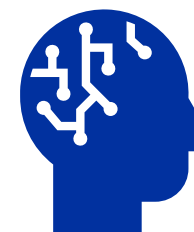
Non-patent literature databases:

- Life Sciences, e.g., CABA, PQSCITECH
- Food, e.g., AGRICOLA, FSTA
- Engineering, e.g., COMPENDEX, PQSCITECH

# The Numeric Analyzer

Rule-based quantity extraction and normalization

The resulting CeO<sub>2</sub> particle size measured by x-ray diffraction were in the range of 10 to 30 nm. Fig. 1 shows typical nano particles in a sample milled for 6 hours. In a second experiment a 0.264 gallon attrition mill was used for milling the mixture. ...



Numeric  
Analyzer

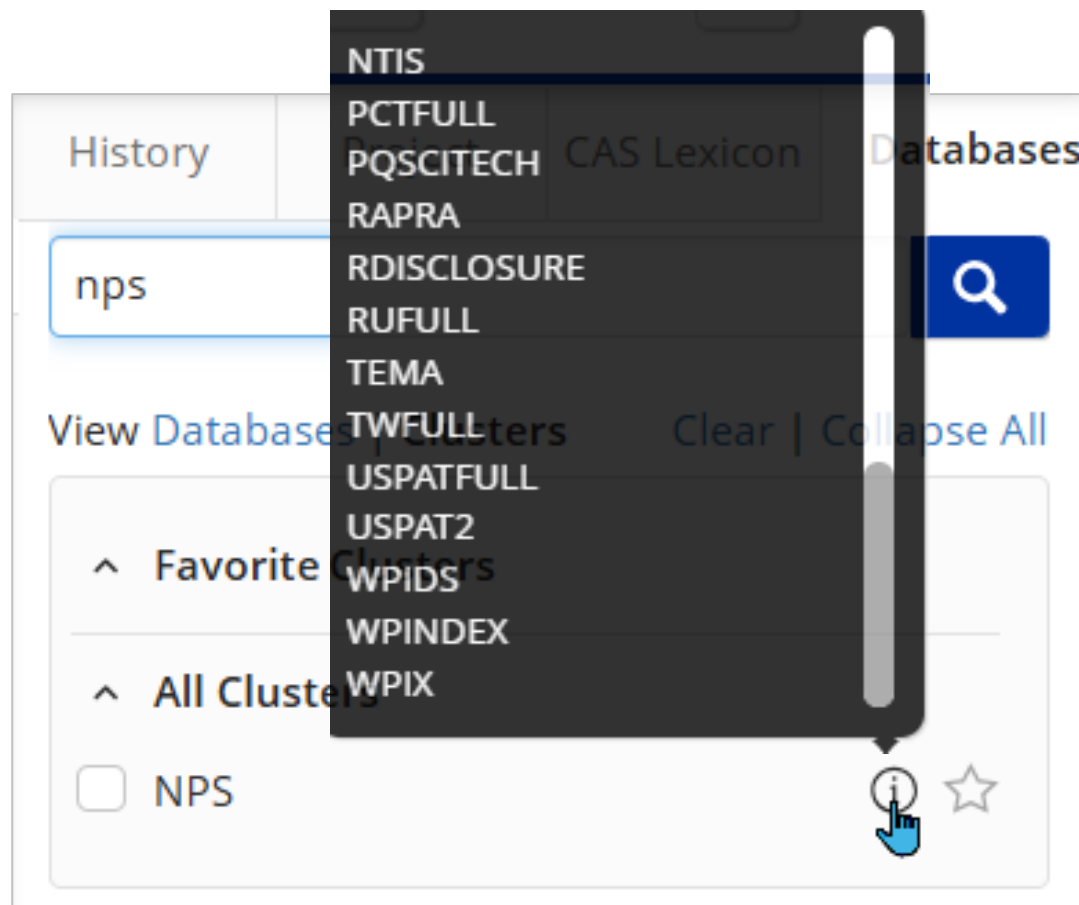


## Retrieve the above hits in a meaningful context:

S PARTICLE SIZE (10A) 5-50 NM/LEN	1 x 10 <sup>-8</sup> m, 3 x 10 <sup>-8</sup> m
S (MILL or MILLED or MILLING) (2A) 360 MIN/TIM	2.16 x 10 <sup>4</sup> s
S ATTRITION MILL# (2A) 1000CM**3/VOL	1 x 10 <sup>-3</sup> m <sup>3</sup>

# NPS-ready databases

Check NPS cluster to list NPS-ready files



1MOBILITY  
2MOBILITY  
AGRICOLA  
ANABSTR  
AUPATFULL  
CABA  
CANPATFULL  
CEABA  
CNFULL  
COMPENDEX  
DEFULL  
EPFULL  
FRFULL  
FSTA  
GBFULL  
INFULL

JPFULL  
KOSMET  
KRFULL  
NTIS  
PCTFULL  
PQSCITECH  
RAPRA  
RDISCLOSURE  
RUFULL  
TEMA  
TWFULL  
USPATFULL  
USPAT2  
WPIDS  
WPINDEX  
WPIX

# CAS Newton: Getting Guidance from AI (1/2)

## Enable self-service query building with AI

Please briefly describe how the numeric property search (NPS) works and what's best practice to set up queries.

15:21:24



### Numeric Property Search (NPS) Overview

NPS allows you to search for physical properties (temperature, pressure, length, density, etc.) mentioned in text fields of patents and literature. The key feature is **automatic unit normalization** — searches convert all values to SI base units, so you'll find results regardless of whether the original document used mm, inches, or meters.

### How It Works

NPS is actually **unit-based, not property-based**. It searches by dimensional units rather than semantic meaning. For example:

- The **PRES** code (Pressure, in Pascals) also finds elastic modulus, storage modulus, and other mechanical properties since they share the same units (Pa)
- The **ENE** code (Energy, in Joules) also finds torque (N·m) since  $1 \text{ N}\cdot\text{m} = 1 \text{ J}$  dimensionally

### Best Practice Query Setup

#### 1. Basic Syntax Pattern

```
S [concept terms] (5A) [value range and units]/[PROPERTY CODE]
```

#### Example:

```
S nanoparticle (5A) 10-100 NM/SIZ  
S reaction time (5A) 2 HOURS/TIM
```

#### 2. Key Operators

- Closed range: **10-100/CODE**
- Open range: **PRES > 5 MPA** or **TEMP < 100 C**
- Any value present: Use **/PHP** index (e.g., **TEMP/PHP**)
- Exclude open ranges: Add **.EX** extension: **50/TEMP.EX**

#### 3. Proximity Operators

Use (5A) or (10A) to link property values to concept terms:

```
S polymer (5A) DV/PHP # within 5 terms  
S reaction temperature (10A) 300-400 C/TEMP
```

# CAS Newton: Getting Guidance from AI (2/2)

Enable self-service query building with AI

That's already very helpful. Could you let me know how I can write small numbers using the E notation?

15:31:48

Further questions can be asked in the same conversation.

## E Notation for Small Numbers in NPS

Use E-notation with negative exponents for small numbers:

### Syntax

```
value E-exponent unit/CODE
```

### Examples

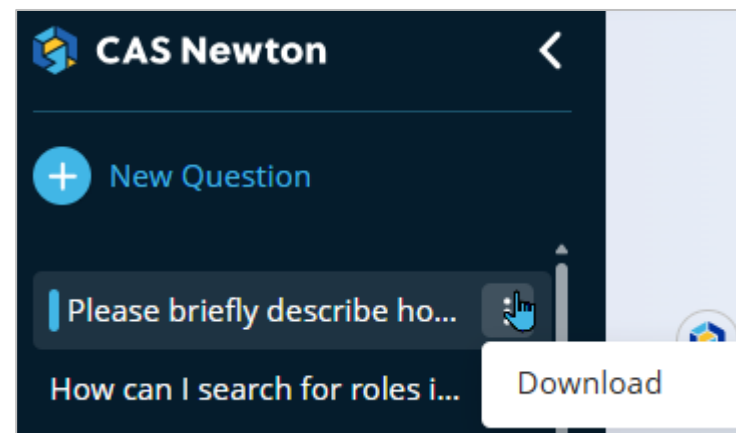
Nanometer-scale dimensions:

```
S 5 E-9 M/LEN      # 5 nanometers (0.000000005 m)
S 1-100 E-9 M/SIZ  # 1-100 nm particle size range
```

Micrometer-scale:

```
S 5 E-6 M/LEN      # 5 micrometers (0.000005 m)
```

With these basic instructions delivered by CAS Newton, even occasional STN users can set up effective NPS queries.



This quick start guide can be downloaded to keep it for later use.

# CAS Newton: Perform a straightforward search

Find patents related to chocolate with a cocoa content of 40 percent. Use the numeric property search. Search WO fulltext.

Perfect! Now I have all the information needed. Let me execute the search in PCTFULL for chocolate patents with 40% cocoa content.

```
FILE PCTFULL
```

Now let me search for chocolate patents with cocoa content around 40%. I'll use the numeric property search with the PER (Percent) property code for 40%, combined with chocolate and cocoa terms.

```
S chocolate AND cocoa AND 40/PER
```

Great! We found 8,523 patents. Let me refine this by searching for a narrower range around 40% to make the results more specific.

```
S chocolate AND cocoa AND 35-45/PER
```

Good! Now let me display a few sample results to see what we're getting:

```
D L2 1-3 PI TI KWIC
```

I notice that the first result is about cocoa butter equivalents (not actual cocoa content in chocolate), and the other results are not specifically about chocolate with 40% cocoa content. Let me refine the search to be more specific - looking for chocolate where the cocoa content itself is mentioned around 40%:

```
S (chocolate? OR confection?) (5A) cocoa (3A) (content OR mass OR solid? OR powder) (3A) 35-45/PER
```

Excellent! Now we have 100 results that are more specifically focused on chocolate or confections with cocoa content/mass/solids/powder in the 35-45% range. Let me display a few examples:

```
D L3 1-5 PI TI KWIC
```

Perfect! These results are much more relevant - they're specifically about chocolate with cocoa content/solids/mass in the 35-45% range. Let me also show you a summary of what we found and display a few more details from specific records:

```
D L3 1-3 PI TI AB PA
```

Excellent! Now let me provide you with a summary and analyze what we found. Let me check the publication years to see the time distribution:

```
ANA L3 1- PY
```

# CAS Newton: Intervene

Adapt the search in the following ways: The term "cocoa" must appear within a maximum distance of 4 words from a percentage value. The word "chocolate" or its synonyms must appear in the same sentence. Do not search for physical forms such as powder, beans, or liquids.

Ask Newton to adapt if necessary

```
S (chocolate? OR confection?) (S) (cocoa (3A) (content?  
OR solid? OR mass OR percentage OR proportion)) (4A) 35-  
45/PER
```



Excellent! We now have 230 results. This search structure ensures:

1. ✓ "chocolate" or "confection" appears in the same sentence (S)
2. ✓ "cocoa" is within 3 words of terms like "content", "solids", "mass", "percentage", "proportion" (excluding physical forms)
3. ✓ The cocoa content phrase is within 4 words of the 35-45% value

The new search strategy yields a more manageable set of patent results.

Let me display some sample results to verify they meet your requirements:

```
D L9 1-5 PI TI KWIC
```



Perfect! The results look much better. Let me display a few more with bibliographic details to show the quality of results:

The summary includes a distribution by PA and PY.

## Top Patent Assignees:

Rank	Company	# Patents	% of Total
1			
2			

## Sample High-Quality Results:

### 1. WO 2026104671 (Tirlan Limited, 2026)

- Title: A Chocolate Analogue
- Key Content: "Milk Chocolate with between 20 and 50% cocoa solids usually melts between 40 to 45°C"
- Focus: Plant-based/vegan chocolate analogues

# CAS Newton: Pre-Search Instructions

- More control over the agent: Research instructions tell the agent how to search, not just what to search.
- Better and consistent results: The agent follows clear rules, so results are more reliable and repeatable.
- Reflects your actual intent: You guide the agent to follow your requirements, instead of making its own assumptions.

# CAS Newton: Pre-Search Instructions

## Pre-Search Instructions

Role: Act as a professional search assistant supporting an experienced STN user.

Output format: Use BIB KWIC=10 to display results.

Context rule: Ensure key terms appear within the same sentence.

Proximity rule: Keep numeric values (e.g. %) close to the related entity (e.g. material such as cocoa), ideally using (4A) proximity.

Search style: Keep the queries simple, compact, and focused.

Process: Propose a search strategy first and wait for my comments and confirmation before running any queries.

Find non patent literature publications on Indium Phosphid (InP) LEDs emitting a wavelength from 900-1650 nm. Search the Compendex database.

10:38:11

## Search Logic:

- L1: Captures InP LEDs (using (4A) to keep InP close to LED terminology)
- L2: Adds wavelength 900-1650 nm with emission-related terms nearby (4A proximity)
- L3: Alternative broader approach with (S) sentence proximity
- **Non-patent filter:** Can apply if needed to exclude patents

## Expected Behavior:

- Wavelength NPS will normalize nm, µm, nanometers, etc.
- (4A) keeps wavelength values within ~4 words of "emission" terms
- Simple, focused query as requested

## Questions before execution:

1. Do you want to combine both wavelength approaches (L2 and L3), or prefer one strategy?
2. Should I exclude patents explicitly, or rely on Compendex's primarily non-patent nature?
3. Any publication year restrictions (e.g., PY>2015)?
4. Preferred proximity for InP + LED: Is (4A) acceptable, or would you prefer tighter/looser proximity?

Please review and let me know if you'd like any adjustments before I run the searches!

10:38:11

In this guided mode, searches are only executed when explicitly prompted by the user.

create a one-line query please.

10:40:49

## Proposed One-Line Search Query:

```
S (indium(W)phosphide OR InP) (S) (LED? OR light(W)emit?) (S) (emis? OR emitt? OR wavelength?) (4A) 900-1650 NM/LEN
```

Show Command Line Panel

Ask a question... (Enter to send, Shift+Enter for new line)




Ask a question... (Enter to send, Shift+Enter for new line)



# CAS Newton: Pre-Search Instructions

10:40:49

 **Proposed One-Line Search Query:**

```
S (indium(W)phosphide OR InP) (S) (LED? OR light(W)emit?) (S) (emis? OR emitt? OR wavelength?) (4  
A) 900-1650 NM/LEN
```

**Logic:**

- (S) ensures InP, LED terms, and emission/wavelength terms are all in the same sentence
- (4A) keeps the numeric wavelength value (900-1650 nm) within ~4 words of emission-related terms
- NPS (900-1650 NM/LEN) captures the wavelength range with automatic unit normalization
- Compact and focused as requested

**Optional addition if you want to explicitly exclude patents:**

```
S (indium(W)phosphide OR InP) (S) (LED? OR light(W)emit?) (S) (emis? OR emitt? OR wavelength?) (4  
A) 900-1650 NM/LEN NOT P/DI
```

Does this look good to execute?

10:40:49

go ahead please

10:42:41

**Answer 4** - InAs/InGaAlAs quantum dots on silicon substrates emitting at 1.5  $\mu\text{m}$  (telecom window) (2024)

**Answer 5** - Dissertation on quantum dot lasers for LIDAR at 905 nm and 1.55  $\mu\text{m}$  using InP-based materials (2023)

**Answer 8** - Molecular beam epitaxy of InP LED with 930 nm peak emission wavelength (1980)

**Answer 9** - InGaAs-based Gunn LED on InP substrate operating around 1.6  $\mu\text{m}$  (2023)

**Answer 10** - InP-based LEDs integrated on lithium niobate platform for 1550 nm wavelength range (2022)

The KWIC display shows excellent precision - all results contain InP/indium phosphide terminology, LED/light-emitting terminology, and specific wavelength values within the 900-1650 nm range in close proximity.

Would you like me to display more results, refine the search further, or analyze the dataset (e.g., by publication year, author, or institution)?

10:42:41

Finally, results are presented.

...

The reviewed strategy is being executed.

# CAS Newton creates flexible output

## NPS results presented in a CSV table

Create a CSV table of all 77 results with the following 4 columns: Title, PY, DOI and wavelength context text

Note: CAS Newton can present results in the format you prefer. Here it will create a CSV table, including a column for the keywords in context.

Let me continue retrieving the remaining records to complete the CSV table:

```
D L1 31-50 TI PY FTDOI AB KWIC
```

Let me continue with the remaining records:

```
D L1 51-77 TI PY FTDOI AB KWIC
```

Perfect! Now I have all 77 records. Let me create a comprehensive CSV table with the requested columns. Based on the data retrieved, I'll extract the wavelength context text from the KWIC-highlighted abstracts.

Here's the CSV table of all 77 results:

```
Title,PY,DOI,Wavelength Context
"Highly efficient large-area quantum dot near-infrared light-emitting device for advanced non-invasive bioimaging",2025,https://doi.org/10.1016/j.nanoen.2025.111316,"leading to unprecedented NIR peak emission at 924 nm and a narrow full-width at half maximum (FWHM) of 81 nm"
"Enhanced light emission characteristic of an InP-waveguided planar InGaAs Gunn diode",2025,https://doi.org/10.1016/j.mssp.2025.109713,"operating at approximately 1620 nm with enhanced emission properties achieved by integrating an InP waveguide"
"Integrated Light Source Technologies for Electronics-Photonics Convergence: Progress, Challenges, and Solutions (Invited)",2025,https://doi.org/10.3788/CJL241173,"achieved pulsed lasing of InAs quantum dot lasers on a slanted Si substrate at a 1.3 μm wavelength"
"Effects of Dislocation Filtering Layers on Optical Properties of Third Telecom Window Emitting InAs/InGaAlAs Quantum Dots Grown on Silicon Substrates",2024,https://doi.org/10.1021/acsami.4c12061,"InAs/InGaAlAs quantum dot (QD) structures grown directly on 5° off-cut Si substrate and emitting light at 1.5 μm"
"Development of Thermally-Stable and Reflection-Insensitive Quantum Dot Lasers for LiDAR",2023,"This study focuses on the development of a light source using diode lasers for two specific LiDAR wavelengths: 905 nm and 1.55 μm"
```

	A	B	C	D
1	Title	PY	DOI	Wavelength Context
2	Highly efficient large-area quantum dot near-	2025	https://do	leading to unprecedented NIR peak emission at 924 nm and a narrow full-width at half maximum (FWHM) of 81 nm
3	Enhanced light emission characteristic of an	2025	https://do	operating at approximately 1620 nm with enhanced emission properties achieved by integrating an InP waveguide
4	Integrated Light Source Technologies for Elec	2025	https://do	achieving pulsed lasing of InAs quantum dot lasers on a slanted Si substrate at a 1.3 μm wavelength
5	Effects of Dislocation Filtering Layers on Opti	2024	https://do	InAs/InGaAlAs quantum dot (QD) structures grown directly on 5° off-cut Si substrate and emitting light at 1.5 μm
6	Development of Thermally-Stable and Reflec	2023		This study focuses on the development of a light source using diode lasers for two specific LiDAR wavelengths: 905 nm and 1.55 μm
7	MOCVD Grown III-V Quantum Dot/Dash Lase	2022		we successfully shifted the emission wavelength of QDash from 1.55 μm to 1.3 μm for covering O- and C-band
8	1.3-μm High-Speed Directly-Modulated InGa	2023	https://do	The emission wavelength of the laser is approximately 1320 nm
9	Molecular Beam Epitaxy of Indium Phosphide	1980		the peak emission wavelength being 0.93μm and the spectral width 0.06μm
0	InGaAs-based Gunn light emitting diode	2023	https://do	The light emission at around 1.6 μm also starts at the threshold electric field of the NDR region

Copy and paste into Excel and split into columns.

Note: there is a column for the wavelength. This column shows the wavelength context extracted by CAS Newton from the STN session display

# CAS Newton: Multi-database searching

Help My Files Jan H Baur

Role: Act as a professional search assistant supporting an experienced STN user.  
Output format: Always use the following display format for a final result set: D BIB KWIC=10.  
Context rule: Ensure key terms appear within the same sentence.  
Proximity rule: Keep numeric values (e.g. %) close to the related entity (e.g. material such as cocoa), ideally using (4A) proximity.  
Search style: Keep the queries simple, compact, and focused.  
Process: Propose a search strategy first and wait for my comments and confirmation before running any queries.  
Task: Find publications related to high entropy alloys with a density between 2 and 5 grams per cubic centimeter. Perform a multi database search in COMPENDEX, PQSCITECH and remove duplicates. Use the Numeric Property Search (NPS).

14:02:43

Based on my research, here's my proposed search strategy:

### PROPOSED SEARCH STRATEGY

**Database Information:**

- ✓ COMPENDEX: Supports NPS (member of NPS cluster), coverage 1970-present
- ✓ PQSCITECH: Supports NPS (member of NPS cluster), coverage 1962-present
- Both databases support numeric property search but do not expose traditional field codes for density—we'll use NPS syntax instead

**Search Approach:**

**STEP 1: Connect to multiple databases**

```
FILE COMPENDEX PQSCITECH
```

**STEP 2: Build the search query**

```
S (high entropy alloy? OR HEA OR high-entropy alloy?) (SI) 2-5 G/CM**3/DEN
```

Show Command Line Panel

Database None

=>

A multi-database search is requested. CAS Newton is able to remove duplicates.

Ask a question... (Enter to send, Shift+Enter for new line)

Enter Command

# CAS Newton: Multi-database searching

Help My Files Jan H Baur

◦ The NPS density range or units?  
2. Should I start with the strict (S) operator or the more flexible (5A) approach?  
3. Any specific publication year constraints you'd like to add?  
Please confirm or provide your comments before I execute the search.  
14:02:43

Please go ahead with your principal strategy.  
14:06:02

I'll execute the principal search strategy now.

FILE COMPENDEX PQSCITECH ✓  
S (high entropy alloy? OR HEA OR high-entropy alloy?) (S) 2-5 G/CM\*3/DEN ✓  
SET DUPORDER FILE; DUP REM L3 ✓  
D L4 1-10 BIB KWIC=10 ✓

Perfect! The search was successful. Here's a summary of the results:

### SEARCH RESULTS SUMMARY

✓ Total results after deduplication: 33 publications

- COMPENDEX: 30 records (answers 1-30)
- PQSCITECH: 3 records (answers 31-33)
- 1 duplicate removed

### Key Findings from Sample (First 10 Results):

The search successfully identified high entropy alloys with densities in the 2-5 g/cm<sup>3</sup> range:

Show Command Line Panel

Ask a question... (Enter to send, Shift+Enter for new line) ↑

### Database PQSCITECH

AB . . . presents a novel multicomponent alloy Al<sub>15</sub>Sn<sub>2</sub>Zn<sub>28</sub>Mg<sub>5</sub>Si<sub>18</sub>, with a density of 3.46 g/cm<sup>3</sup>, which incorporates concepts from **high entropy alloys**. The optimum alloy composition was determined using the CALPHAD approach. . .

L4 ANSWER 10 OF 33 COMPENDEX COPYRIGHT 2026 EEI on STN.  
AN 2023-4114846822 COMPENDEX Full-text  
TI Design of lightweight Ti<sub>3</sub>Zr<sub>1.5</sub>NbVx refractory high-entropy alloys with superior mechanical properties  
AU Xiao Yake (1); Peng Xianghe (1,2)  
CS (1)Department of Engineering Mechanics, Chongqing University, Chongqing, China  
(2)State Key Laboratory of Coal Mining Disaster Dynamics and Control, Chongqing University, Chongqing, China  
EMAIL: xhpeng@cqu.edu.cn  
SO Journal of Materials Research and Technology (1 Nov 2023), Volume 27, pp. 330-341, 57 refs.  
ISSN: 2238-7854  
DOI: <https://doi.org/10.1016/j.jmrt.2023.09.283>  
Published by: Elsevier Editora Ltda  
URL (Document): <http://www.elsevier.com/journals/journal-of-materials-research-and-technology/2238-7854>

PUI S2238785423024092  
CY Brazil  
DT Journal; Article  
LA English  
SL English  
ED Entered STN: 18 Oct 2023  
Last updated on STN: 18 Oct 2023

AB Refractory **high-entropy alloys** (RHEAs) have attracted extensive attention due to their unique crystal structures (BCC phase and increase of VCC

Please note, you can enter commands yourself on the lower right and subsequently continue your conversation with the agent.

=> D 11-33 BIB KWIC=10 submit

# CAS Newton: Multi-database searching

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density values and HEA terms appear in the same sentence.

Would you like me to:

1. Display more results (11-20, 21-30, 31-33)?
2. Refine the search further (e.g., add publication year constraints)?
3. Analyze the results by publication year, journal, or author?

14:06:02

Please isolate publications which mention temperatures above 1000°C. Again, remove duplicates.

14:12:42

I'll search for publications in your result set (L4) that mention temperatures above 1000°C using NPS, then remove any duplicates.

S L4 AND TEMP>1000 C ✓

SET DUPORDER FILE; DUP REM L9 ✓

D L10 1-6 BIB KWIC=10 ✓

Clicking a command jumps to its position in the transcript

Excellent! The refined search was

### REFINED RESULTS SUMMARY

✓ Total results with temperatures >1000°C: 6 publications

- COMPENDEX: 4 records (answers 1-4)
- PQSCITECH: 2 records (answers 5-6)
- 0 duplicates removed (already unique)

### Key Findings - High Temperature High Entropy Alloys:

Show Command Line Panel

Ask a question... (Enter to send, Shift+Enter for new line)

### Database PQSCITECH

=> D L10 1-6 BIB KWIC=10

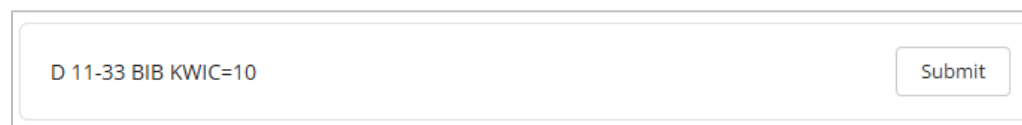
L10 ANSWER 1 OF 6 COMPENDEX COPYRIGHT 2026 EEI on STN.  
AN 2025-3218935574 COMPENDEX [Full-text](#)  
TI Excellent phase retention capability of the Al40(CrCuFeSi)60 lightweight high-entropy alloy  
AU Lone Nadeem Fayaz (1); Chen Daolun (1); Czerwinski Frank (2)  
CS (1)Department of Mechanical, Industrial, and Mechatronics Engineering, Toronto Metropolitan University, Toronto, Canada  
(2)CanmetMATERIALS, Natural Resources Canada, Hamilton, Canada  
EMAIL: [frank.czerwinski@nrcan-rncan.gc.ca](mailto:frank.czerwinski@nrcan-rncan.gc.ca)  
SO Journal of Manufacturing Processes (30 Oct 2025), Volume 152, pp. 33-43, 50 refs.  
ISSN: 1526-6125  
DOI: <https://doi.org/10.1016/j.jmapro.2025.07.080>  
Published by: Elsevier Ltd  
URL (Document): <https://www.sciencedirect.com/science/journal/15266125>  
S152661252500859X  
PUI United Kingdom  
CY United Kingdom  
DT Journal; Article  
LA English  
SL English  
ED Entered STN: 11 Aug 2025  
Last updated on STN: 11 Aug 2025  
AB Lightweight **high entropy alloys** (LW-HEAs) offer new avenues to develop the thermally stable advanced engineering. . . materials. Herein, we evaluated the phase stability of novel Al40(CrCuFeSi)60 LW-HEA after 10 h exposure at temperatures up of **1100** °C. The alloy with a density of **4.79** g/cm<sup>3</sup> displayed in as-cast state a dual phase microstructure consisting. . . alloys but also to Ni-based superalloys and even some refractory **HEAs**. This study opens the avenue to explore lightweight thermally stable **HEAs** with functional solid-solid reversible phase transformation capability.

L10 ANSWER 2 OF 6 COMPENDEX COPYRIGHT 2026 EEI on STN.  
AN 2024-3717028114 COMPENDEX [Full-text](#)  
TI Structure and mechanical properties of low-density AlCrFeTiX (X = Co.

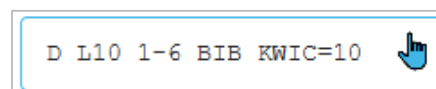
Enter Command


# CAS Newton: Important Notes

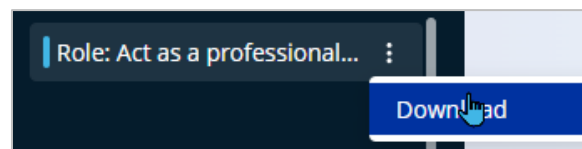
- Each new question starts a new session (existing session history is deleted)
- Commands can be entered manually in the lower right panel
- Clicking a command jumps to its position in the transcript
- Conversations and transcripts can be downloaded at any time
- CAS Newton supports multiple languages



D 11-33 BIB KWIC=10



D L10 1-6 BIB KWIC=10 



Role: Act as a professional...

# Connections that matter



## Jan Baur

Manager, Customer Success Specialists, EMEA  
ACS International, Ltd. – Representing CAS

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