

# Circular Economy Ontology Network (CEON) - Material Module

## Metadata

### IRI

<http://w3id.org/CEON/ontology/material/>

### Title

Circular Economy Ontology Network (CEON) - Material Module

### Creator

Huanyu Li

### Contributor

Eva Blomqvist

Mikael Lindecrantz

Robin Keskisärkkä

### Date Created

2023-03-16

### License

<https://creativecommons.org/licenses/by/4.0/>

### Version Iri

<http://w3id.org/CEON/ontology/material/0.2/>

### Version Info

0.2

### Preferred Namespace Prefix

material

### Preferred Namespace Uri

<http://w3id.org/CEON/ontology/material/>

### Description

The Material module of CEON (Circular Economy Ontology Network).

### Covers Requirements

In addition to requirements covered by imported ODPs, covers the following requirements from Onto-DESIDE D3.1: CVN-Resource-2, CVN-ResourceType-4, C3-3, E1-3, E2-4, E5-2, T1-1, T10-2.

## Classes

### Aluminum<sup>C</sup>

#### IRI

<http://w3id.org/CEON/ontology/material/Aluminum>

#### Sub Class Of

[ChemicalElement<sup>C</sup>](#)

### Boron<sup>C</sup>

#### IRI

<http://w3id.org/CEON/ontology/material/Boron>

#### Sub Class Of

[ChemicalElement<sup>C</sup>](#)

## Celulose<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/Celulose>

**Sub Class Of** [ChemicalElement<sup>C</sup>](#)

## Chemical Element<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/ChemicalElement>

**Sub Class Of** [Chemical substance<sup>C</sup>](#)

**Super Class Of**

[Aluminum<sup>C</sup>](#)  
[Boron<sup>C</sup>](#)  
[Celulose<sup>C</sup>](#)  
[Chromium<sup>C</sup>](#)  
[Copper<sup>C</sup>](#)  
[Dysprosium<sup>C</sup>](#)  
[Iron<sup>C</sup>](#)  
[Magnesium<sup>C</sup>](#)  
[Manganese<sup>C</sup>](#)  
[Neodymium<sup>C</sup>](#)  
[Nickel<sup>C</sup>](#)  
[Niobium<sup>C</sup>](#)  
[Silicon<sup>C</sup>](#)  
[Titanium<sup>C</sup>](#)  
[Zinc<sup>C</sup>](#)

## Chemical entity<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/ChemicalEntity>

**Description** A chemical entity is an abstraction of entities that can compose matter. For instance, a chemical entity can be a molecular entity or a chemical substance.

**Sub Class Of** [resourceODP:Matter<sup>C</sup>](#)

**In Range Of** [has chemical entity<sup>op</sup>](#)

**Super Class Of**  
[Chemical substance<sup>C</sup>](#)  
[Molecular entity<sup>C</sup>](#)

## Chemical substance<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/ChemicalSubstance>

**Description** A chemical substance is made up of a collection of molecular entities.

**Sub Class Of** [Chemical entity<sup>C</sup>](#)

**Super Class Of** [ChemicalElement<sup>C</sup>](#)

## Chromium<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/Chromium>

**Sub Class Of** [ChemicalElement<sup>C</sup>](#)

## Copper<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/Copper>

**Sub Class Of** [ChemicalElement<sup>C</sup>](#)

## Dysprosium<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/Dysprosium>

**Sub Class Of** [ChemicalElement<sup>C</sup>](#)

## Iron<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/Iron>

**Sub Class Of** [ChemicalElement<sup>C</sup>](#)

## Magnesium<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/Magnesium>

**Sub Class Of** [ChemicalElement<sup>C</sup>](#)

## Manganese<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/Manganese>

**Sub Class Of** [ChemicalElement<sup>C</sup>](#)

## Material<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/Material>

**Description** Material as a sub-concept of Matter, can be a substance or a collection of substance which a physical object is composed of.

**Sub Class Of** [resourceODP:Matter<sup>C</sup>](#)

**In Domain Of** [has chemical entity<sup>op</sup>](#)  
[has material component<sup>op</sup>](#)

**Restriction** [has chemical entity<sup>op</sup>](#) some [Material<sup>C</sup>](#)

## Material component<sup>C</sup>

<b>IRI</b>	<a href="http://w3id.org/CE0N/ontology/material/MaterialComponent">http://w3id.org/CE0N/ontology/material/MaterialComponent</a>
<b>Description</b>	A material component is a part of a material.
<b>Sub Class Of</b>	<a href="#">resourceODP:Constituent<sup>C</sup></a>
<b>In Range Of</b>	<a href="#">has material component<sup>OP</sup></a>

## Molecular entity<sup>C</sup>

<b>IRI</b>	<a href="http://w3id.org/CE0N/ontology/material/MolecularEntity">http://w3id.org/CE0N/ontology/material/MolecularEntity</a>
<b>Description</b>	A molecular entity means a singular/distinguishable entity. It can be for instance, atom, ion.
<b>Sub Class Of</b>	<a href="#">Chemical entity<sup>C</sup></a>

## Neodymium<sup>C</sup>

<b>IRI</b>	<a href="http://w3id.org/CE0N/ontology/material/Neodymium">http://w3id.org/CE0N/ontology/material/Neodymium</a>
<b>Sub Class Of</b>	<a href="#">ChemicalElement<sup>C</sup></a>

## Nickel<sup>C</sup>

<b>IRI</b>	<a href="http://w3id.org/CE0N/ontology/material/Nickel">http://w3id.org/CE0N/ontology/material/Nickel</a>
<b>Sub Class Of</b>	<a href="#">ChemicalElement<sup>C</sup></a>

## Niobium<sup>C</sup>

<b>IRI</b>	<a href="http://w3id.org/CE0N/ontology/material/Niobium">http://w3id.org/CE0N/ontology/material/Niobium</a>
<b>Sub Class Of</b>	<a href="#">ChemicalElement<sup>C</sup></a>

## Silicon<sup>C</sup>

<b>IRI</b>	<a href="http://w3id.org/CE0N/ontology/material/Silicon">http://w3id.org/CE0N/ontology/material/Silicon</a>
<b>Sub Class Of</b>	<a href="#">ChemicalElement<sup>C</sup></a>

## Titanium<sup>C</sup>

<b>IRI</b>	<a href="http://w3id.org/CE0N/ontology/material/Titanium">http://w3id.org/CE0N/ontology/material/Titanium</a>
<b>Sub Class Of</b>	<a href="#">ChemicalElement<sup>C</sup></a>

## Zinc<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/Zinc>

**Sub Class Of** [ChemicalElement<sup>C</sup>](#)

## Constituent<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/resource0DP/Constituent>

**Super Class Of** [Material component<sup>C</sup>](#)

## Matter<sup>C</sup>

**IRI** <http://w3id.org/CE0N/ontology/resource0DP/Matter>

**Super Class Of**  
[Chemical entity<sup>C</sup>](#)  
[Material<sup>C</sup>](#)

## Object Properties

### has chemical entity<sup>op</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/hasChemicalEntity>

**Description** hasChemicalEntity intends to represent that a material can have a collection of chemical entities.

**Domain** [Material<sup>C</sup>](#)

**Range** [Chemical entity<sup>C</sup>](#)

### has material component<sup>op</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/hasMaterialComponent>

**Description** hasMaterialComponent intends to represent that a material can have a collection of components.

**Domain** [Material<sup>C</sup>](#)

**Range** [Material component<sup>C</sup>](#)

## Datatype Properties

### Anonymous Formula<sup>dp</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/AnonymousFormula>

**Description**

AnonymousFormula represents that a molecular entity has the anonymous formula in a string.

### Descriptive Formula<sup>dp</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/DescriptiveFormula>

**Description**

DescriptiveFormula represents that a molecular entity has the descriptive formula in a string.

### Hill Formula<sup>dp</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/HillFormula>

**Description**

HillFormula represents that a composition has the hill formula in a string.

### Reduced Chemical Formula<sup>dp</sup>

**IRI** <http://w3id.org/CE0N/ontology/material/ReducedChemicalFormula>

**Description**

ReducedChemicalFormula represents that a molecular entity has the reduced chemical formula in a string.

## Annotation Properties

### description<sup>ap</sup>

**IRI** <http://purl.org/dc/elements/1.1/description>

## Namespaces

:

<http://w3id.org/CE0N/ontology/material/>

**dc**

<http://purl.org/dc/elements/1.1/>

**dcterms**

<http://purl.org/dc/terms/>

**odp**

<http://www.ontologydesignpatterns.org/schemas/cpannotationschema.owl#>

**owl**

<http://www.w3.org/2002/07/owl#>

**prov**

<http://www.w3.org/ns/prov#>

**rdf**

<http://www.w3.org/1999/02/22-rdf-syntax-ns#>

**rdfs**

<http://www.w3.org/2000/01/rdf-schema#>

**resourceODP**

<http://w3id.org/CE0N/ontology/resourceODP/>

**vann**

<http://purl.org/vocab/vann/>

## Legend

c	Classes
op	Object Properties
dp	Datatype Properties
ap	Annotation Properties