

## B82B

### NANOSTRUCTURES FORMED BY MANIPULATION OF INDIVIDUAL ATOMS, MOLECULES, OR LIMITED COLLECTIONS OF ATOMS OR MOLECULES AS DISCRETE UNITS; MANUFACTURE OR TREATMENT THEREOF

#### Definition statement

*This place covers:*

Precise arrangements of matter on molecular or atomic level having particularly shaped configurations (i.e. nanostructural assemblages) formed during manufacture which are distinct from both naturally occurring and chemically produced chemical or biological arrangements composed of similar matter, wherein each assemblage includes at least one essential integral element:

- Consisting solely of an atom, a molecule, or an atomically precise limited collection of either atoms or molecules (e.g. the collection in its entirety would be undetectable by any optical microscope with diffraction limited resolution) and
- Formed by having its atom, molecule, or limited collection of atoms or molecules individually manipulated as a discrete unit during the manufacture of its arrangement.

The essential integral elements of nanostructural assemblages when they include structural features limiting their use to these assemblages.

The manufacture or treatment of the above type of nanostructural assemblages when the manufacturing or treating creates an essential structural feature of an assemblage and utilizes either:

- Processes having one or more steps with specialized features directly related to individually manipulating atoms or molecules as discrete units when forming final products, or
- Apparatus specially adapted for performing at least one step in such processes.

#### Relationships with other classification places

General relationship of [B82B](#) with section [C](#):

The terminology "particularly shaped configurations distinct from both naturally occurring and chemically produced chemical or biological arrangements composed of similar matter" in the definition statement is intended to preclude classification of chemical or biological structures per se in this subclass that are similar in size. As a practical matter, what is intended by "distinct" in this phrase is that the only nanosized structures appropriate for this subclass are those that accomplish a function that is not inherent in the chemical or biological composition from which they are formed (e.g. a nanosized structure shaped so that an atom or molecule component is movable between locations to act as a switch in an electrical operation would be classified in [B82B](#) even if it were formed using a method that included a chemical or biological step).

The subclasses under section C, "Chemistry; Metallurgy", specifically provide for the majority of these excluded chemical or biological structures per se, or specially adapted processes or apparatus for the manufacture or treatment thereof (e.g. in classes [C08](#), [C12](#)).

For guidance as to whether classification in subclass [B82B](#) applies, the following general principles of classification for [B82B](#) under CPC are given.

A device is classified in [B82B](#) if:

- The device consists of a limited number of atoms, molecules or nanostructures, and
- The manufacturing process is a bottom-up process that manipulates and assembles a limited number of atoms, molecules or nanostructures.

A method or an apparatus for manufacturing nanostructures is classified in [B82B](#) if:

- The method is a bottom-up process.

## Relationships with other classification places

- The apparatus manipulates and assembles a limited number of atoms, molecules or nanostructures.

In relation to [B82B](#) NOTE 3, which is about further classification in subclass [B82Y](#), it is noted that subclass [B82Y](#) refers to obligatory supplementary classification relating in particular to specific uses or applications of nanostructures. Since there is no specific need to tag documents already classified in [B82B](#) for their nanotechnological aspects, when further allocation in [B82Y](#) would not identify anything not already derivable from allocated [B82B](#) CPC symbols, the allocation of additional [B82Y](#) CPC symbols should be relatively restricted.

## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Nanocapsules for medicinal preparations	<a href="#">A61K 9/51</a>
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### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Nanostructures and nanoelectromechanical systems [NEMS] formed by top-down processes	<a href="#">B81B</a> , <a href="#">B81C</a>
Carbon nanostructures, e.g. carbon nanotubes, formed by chemical processes	<a href="#">C01B 32/15</a>
Investigating or analyzing surface structures in atomic ranges using scanning-probe techniques	<a href="#">G01Q 10/00</a> - <a href="#">G01Q 90/00</a>
Details of apparatus using scanning-probe techniques	<a href="#">G01Q 10/00</a> - <a href="#">G01Q 90/00</a>
Thin magnetic film formed from spin-exchange coupled multi-layers	<a href="#">H01F 10/32</a>
Apparatus or processes specially adapted for manufacturing or assembling devices by applying magnetic films to substrates that are formed from nanostructures	<a href="#">H01F 41/30</a>
Semiconductor nanowires, nanotubes or whiskers	<a href="#">H01L 29/06</a>

## Special rules of classification

Special rules for additional classification in other subclasses:

Except when the operation or practical utility of the nanostructure is inherently completely limited to a microscopic environment, the nanostructures that are covered by this subclass should also be obligatorily classified in subclasses that otherwise appropriately provide for their novel and unobvious structural or functional features.

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Manufacture	Chemical, electrical, or mechanical process or apparatus for accomplishing one or more of the following operations on a nanostructural assemblage or an essential integral element thereof: assembling, associating, bonding, constructing, creating, cutting, distorting, electric photographing, etching, fabricating, fastening, finishing, joining, juxtaposing, positioning, shaping, or working.
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Nanosize or nanoscale	Controlled geometrical size below 100 nanometres (nm) in one or more dimensions.
Nanostructure	Entity having at least one nanosized functional component that makes physical, chemical or biological properties or effects available, which are uniquely attributable to the nanoscale.

## B82B 1/00

### Nanostructures formed by manipulation of individual atoms or molecules, or limited collections of atoms or molecules as discrete units

#### Definition statement

*This place covers:*

Nanostructures formed by a bottom-up process by manipulation of individual atoms or molecules, or a limited collection thereof as discrete units.

#### References

##### Limiting references

*This place does not cover:*

chemical or biological processes per se	section <a href="#">C</a>
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## B82B 3/00

### Manufacture or treatment of nanostructures by manipulation of individual atoms or molecules, or limited collections of atoms or molecules as discrete units

#### Definition statement

*This place covers:*

Bottom-up manufacturing processes for manipulating individual atoms or molecules, or a limited collection thereof as discrete units.

#### References

##### Limiting references

*This place does not cover:*

chemical or biological processes per se	section <a href="#">C</a>
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