

C25D

PROCESSES FOR THE ELECTROLYTIC OR ELECTROPHORETIC PRODUCTION OF COATINGS; ELECTROFORMING (decorating textiles by metallising [D06Q 1/04](#); manufacturing printed circuits by metal deposition [H05K 3/18](#)); APPARATUS THEREFOR

Definition statement

This subclass/group covers:

Electroforming.

Electroplating, baths therefor.

Electroplating characterized by the process; pretreatment or after-treatment of workpieces.

Electroplating characterized by the article coated.

Electrolytic coating other than with metals.

Electrolytic coating by surface reaction, reforming conversion layers.

Electrophoretic coating.

Electrolytic or electrophoretic production of coating containing embedded materials, e.g. particles, whiskers, wires.

Constructional parts, or assemblies thereof, of cells for electrolytic coating.

Electrolytic coating plants.

Plants for servicing or operating cells for electrolyting coating.

Relationship between large subject matter areas

- Multi-step processes for surface treatment of metallic material involving at least one

process provided for in class C23 and at least one process provided for in class

C25 are classified in [C23F 17/00](#).

- Coating for obtaining at least two superposed coatings by combination of methods provided for in subclasses [C23C](#) and [C25D](#) are classified in [C23C 28/00](#).

- The electrolytic or electrophoretic purification of materials is classified according to the nature of the liquid in the relevant places, e.g. [A01K 63/00](#), [C02F 1/46](#), [C25B 15/08](#), [C25D 21/16](#), [C25F 7/02](#).

- Electrolytic production or recovery of metals and alloys from solutions or melts is classified in [C25C](#)
 - Processes and apparatuses for electrochemical removal of materials from object, e.g. etching, polishing, brightening are classified in [C25F](#).
 - An electrothermal treatment of ores or metallurgical products for obtaining metals or alloys is classified in [C22B 4/00](#) and does not involve an electrolytic process.
- Alloys as such, prepared by electrolytic methods are classified in [C22C](#).

References relevant to classification in this subclass

This subclass/group does not cover:

Laminating metals	B32B 15/00
Treatment of water, waste water, or sewage by electrochemical means, e.g. electrolysis	C02F 1/46
Compositions for electrophoretic coating of polymers	C09D 5/44
Inhibition of corrosion by anodic or cathodic protection	C23F 13/00
Single crystal growth	C30B

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

Metallising textile	D06M 11/83
Decorating textiles by locally metallising	D06Q 1/04
Manufacturing printed circuits by metal deposition	H05K 3/18

Informative references

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

Lacquering	B44D
Apparatus for continuously conveying articles into bath	B65G 49/00
Nanostructures	B82B 3/00
Electroless plating	C23C 18/16
Electroless plating	C23C 18/16
Chemical conversion coating	C23C 22/00
Coating for obtaining at least two superposed coatings either by methods not provided for in a single one of groups C23C 2/00 to C23C 26/00 or by combinations of methods provided for in subclasses C23C and C25D	C23C 28/00
Electrolytic etching, polishing, brightening	C25F
Electrolytic coating of blades, turbines	F01D 5/00
Measuring thickness	G01B
Electrochemical methods of analysis	G01N 27/26
Controlling or regulating	G05B
Magnetic heads	G11B 5/00
Cables, conductors, insulators	H01B , H01R
Capacitors	H01G 9/00
Semiconductors, wafers	H01L 21/00
Solar Cells	H01L 31/00
Installation of electrical cables or lines	H02G
Manufacturing of printed circuit board by metal deposition	H05K 3/18

C25D 1/00

Electroforming

Definition statement

This subclass/group covers:

Electroforming processes, i.e. processes involving the reproduction or formation of objects by electrodeposition in which the deposit does not permanently remain with the base upon which deposition is made, e.g. :

- Electroforming of tubes, wires, moulds
- Electroforming of 3D-structures, 3D-systems
- Electroforming of nanostructures, like aluminum AAO templates or arrays
- Electroforming by electrophoresis

References relevant to classification in this group

This subclass/group does not cover:

Layered products comprising essentially metals	B32B 15/00
Single crystal growth	C30B

Informative references

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

Nanostructures (AAO)	B82B 3/00
Controlling or regulating	G05B
Measuring thickness	G01B
Installation of electrical cables or lines	H02G
Cables, conductors, insulators	H01B , H01R

Special rules of classification within this group

AAO templates when they are used as moulds for forming nanoarrays are classified in [C25D 1/10](#).

Synonyms and Keywords

In patent documents the following abbreviations are often used:

AAO	Aluminum Anodic Oxidation, for anodised aluminum templates or arrays, which may serve as moulds for manufacturing nanowires
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C25D 3/00

Electroplating: Baths therefor

Definition statement

This subclass/group covers:

Baths for electroplating, e.g solutions, melts and also solid electrolytes used in the bath.

Informative references

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

Electroless plating baths	C23C 18/00
Electrolytic etching, polishing, brightening	C25F

C25D 3/40

from cyanide baths

Definition statement

This subclass/group covers:

Electroplating solutions of copper cyanide baths, e.g. baths with Cu⁺.

C25D 3/56

of alloys

Definition statement

This subclass/group covers:

Liquid electrolytic bath for plating alloys, e.g. alloys containing more than 50% by weight of iron, nickel or cobalt or more than 50% by weight of zinc or more than 50% by weight of platinum group metals or also NiP, CoP alloys

C25D 3/60

containing more than 50% by weight of tin

Definition statement

This subclass/group covers:

Liquid electrolytic bath for tin alloys, also SnP alloys.

C25D 3/66

from melts

Definition statement

This subclass/group covers:

Electrolytic bath from melts of fused baths, from ionic liquids, e.g. molten salt baths.

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Melt	molten salt or ionic liquid or fused bath
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C25D 5/00

Electroplating characterised by the process; Pretreatment or after treatment of workpieces

Definition statement

This subclass/group covers:

Processes of electroplating, pretreatment of surfaces to be electroplated or aftertreatment of electroplated surfaces, e.g.

- bath vibrations,
- electromagnetic influence (e.g. IR-light, UV-light),
- pressure influence,
- temperature influence

References relevant to classification in this group

This subclass/group does not cover:

Selective plating of , spraying of electrolyte for and regulating thickness of conveyed wires, strips or foils, e.g. using masks	C25D 7/06
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Informative references

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

Controlling or regulating	G05B
Coating for obtaining at least two superposed coatings either by methods not provided for in a single one of groups C23C 2/00 to C23C 26/00 or by combinations of methods provided for in subclasses C23C and C25D	C23C 28/00
Electrolytic etching, polishing, brightening	C25F

Special rules of classification within this group

The following Subgroups of IPC are not used in the CPC classification scheme. Subject matter covered by those groups is classified as the following:

C25D5/24 is covered by [C25D 5/34](#).

C25D5/26 is covered by [C25D 5/36](#).

C25D5/28 is covered by [C25D 5/38](#) and [C25D 5/40](#).

C25D5/30 is covered by [C25D 5/42](#) and [C25D 5/44](#).

C25D5/32 is covered by [C25D 5/46](#).

C25D 5/08

Electroplating with moving electrolyte, e.g. jet electroplating
[N: ([C25D 5/026](#) takes precedence)]

Definition statement

This subclass/group covers:

Electroplating with moving electrolyte, e.g. for plating at high current densities.

C25D 5/16

Electroplating with layers of varying thickness

Definition statement

This subclass/group covers:

Electroplating with layers of varying surfaces, e.g. roughened surfaces, e.g. Hull cell

C25D 5/54

Electroplating of non-metallic surfaces ([C25D 7/12](#) takes precedence)

Definition statement

This subclass/group covers:

Electroplating on non-metallic surfaces, e.g. carbon or carbon composites, not on a seed layer.

C25D 5/56

of plastics

Definition statement

This subclass/group covers:

On plastics (when the plastic layer is thin, or the plastic is conductive).

C25D 7/00

Electroplating characterised by the article coated

Definition statement

This subclass/group covers:

Articles coated by electroplating, e.g. magnets, bolts, nuts, jewels, clockworks, nanoparticles, solar cells, etc.

References relevant to classification in this group

This subclass/group does not cover:

Laminating metals	B32B 15/00
Electroplating wafers comprising a seed layer	C23C 28/02 , H01L 21/00 ,
Electroplating solar cells comprising a seed layer	C23C 28/02 , H01L 31/00 ,

Informative references

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

Installation of electrical cables or lines	H02G
Cables, conductors, insulators	H01B 13/0033 , H01R
Printed circuit board	H05K 3/00
Semiconductors, wafers	H01L 21/00
Solar Cells	H01L 31/00
Capacitors	H01G 9/00
Magnetic heads	G11B 5/00
Electrolytic coating of blades, turbines	F01D 5/00

C25D 7/06

Wires; Strips; Foils

Definition statement

This subclass/group covers:

wires strips or foils,

- plated in horizontal cells
- in vertical cells
- in radial cells
- characterised by the anode used,
- the diaphragms used,
- the conducting rolls used ,
- the isolating rolls used,
- selective plating (using masks),
- spraying of electrolyte,
- regulating the thickness of the coating

Special rules of classification within this subclass

Apparatus for electroplating metallic strips or foils are classified in [C25D 7/06](#) subgroups only when relevant subgroups, e.g. radial cells, are available. If no relevant subgroups are available, then apparatus for electroplating metallic strips or foils are classified in [C25D 7/06](#) or [C25D 7/06](#) and [C25D 17/00](#) subgroups

C25D 7/10

Bearings

Definition statement

This subclass/group covers:

Bearings, any article for which tribological properties are important, sliding members.

C25D 7/12

Semiconductors

Definition statement

This subclass/group covers:

Only electroplating directly onto a semiconductor or wafer or solar cell.

C25D 9/00

Electrolytic coating other than with metals ([C25D 11/00](#), [C25D 15/00](#) take precedence; electrophoretic coating [C25D 13/00](#))

Definition statement

This subclass/group covers:

Electrolytic coating with other materials than metals, e.g. organic materials, inorganic materials e.g. plating with ZnO from a solution comprising Zn²⁺ ions and OH⁻ ions and by varying the pH.

References relevant to classification in this group

This subclass/group does not cover:

Lacquering	B44D
Anodic or cathodic protection (inhibit corrosion)	C23F 13/00
Electrophoretic coating in general	C25D 13/00
Single crystal growth	C30B

Informative references

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

Plating of hydroxyapatite, for dental implants	A61L 27/32 , A61K 6/083
Controlling or regulating	G05B
Measuring thickness	G01B

C25D 11/00

Electrolytic coating by surface reaction, i.e. forming conversion layers

Definition statement

This subclass/group covers:

Electrolytic coating by surface reaction with formation of conversion layers, e.g.

Anodisation under spark discharge (ANOF), pulsed or modulated current or potential, formation of AAO templates or arrays, boridising

Phosphatising, chromatising

References relevant to classification in this group

This subclass/group does not cover:

Chemical surface treatment of metallic material by reaction of the surface (chemical conversion), like phosphatising or chromatising	C23C 22/00
Inhibit corrosion of metals by anodic or cathodic protection	C23F 13/00
Electrolytic removal of materials (etching, polishing, cleaning)	C25F
Electroplating with an oxide, not a conversion of the surface	C25D 9/00
Coating with an oxide by electromigration of charged particles	C25D 13/02
Manufacturing of printed circuit board by metal deposition	H05K 3/18

Informative references

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

Controlling or regulating	G05B
Semiconductors, wafers	H01L 21/00

Synonyms and Keywords

In patent documents the following abbreviations are often used:

AAO	Aluminum Anodic Oxidation
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ANOF	Anodic oxidation by spark discharge
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In patent documents the following expression/words "anodic oxidation", "anodisation", "electrochemical conversion coating" and "eloxieren" are often used as synonyms.

C25D 11/16

Pretreatment

Definition statement

This subclass/group covers:

Pretreatment of the electrolytic coated surface, e.g. desmutting.

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Desmutting	Removal of smut layer formed after etching a metal or an alloy
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C25D 11/18

After-treatment, e.g. pore sealing (lacquering [B44D](#))

Definition statement

This subclass/group covers:

After treatment of electrolytic coated surface, e.g., physical or chemical after treatment, e.g. using organic dyestuffs, for sealing layers.

C25D 11/36

Phosphatising

Definition statement

This subclass/group covers:

Phosphating, NiP.

Special rules of classification within this group

If the substrate is transformed, e.g. conversion coating, it is classified in [C25D 11/36](#)

Coating of a substrate with phosphate is classified in [C25D 9/04](#) subgroups..

In case of doubt, it is classified in both groups.

C25D 13/00

Electrophoretic coating ([C25D 15/00](#) takes precedence; apparatus for continuously conveying articles into baths [B65G](#), e.g. [B65G 49/00](#))

Definition statement

This subclass/group covers:

Electrophoretic coatings that do not contain embedded materials, e.g. particles, whiskers or wires

References relevant to classification in this group

This subclass/group does not cover:

Lacquering	B44D
Compositions for electrophoretic coating of polymers, , e.g. electrografting	C09D 5/44 , C09D 5/4476
Electrolytic or electrophoretic production of coating containing embedded materials	C25D 15/00
Electrolytic coating other than with metals, by deposition of ions, not through electromigration	C25D 9/00

Informative references

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

Apparatus for continuously conveying articles into bath	B65G 49/00
Measuring thickness	G01B
Controlling or regulating	G05B

C25D 13/22

Servicing or operating

Definition statement

This subclass/group covers:

Servicing and operating; apparatus and multistep processes.

C25D 15/00

Electrolytic or electrophoretic production of coatings containing embedded materials, e.g. particles, whiskers, wires

Definition statement

This subclass/group covers:

Electrolytic or electrophoretic production of coating containing embedded materials, e.g. particles, whiskers, wires.

References relevant to classification in this group

This subclass/group does not cover:

Lacquering comprising pigments	B44D
Compositions for electrophoretic coating of copolymers	C09D 5/44

Special rules of classification within this subclass

When the coating is a self-supporting article, it is classified only in [C25D 1/00](#)

C25D 15/02

Combined electrolytic and electrophoretic processes

Definition statement

This subclass/group covers:

Combined electrolytic and electrophoretic processes for coatings containing embedded particles.

C25D 17/00

Constructional parts, or assemblies thereof, of cells for electrolytic coating (apparatus for continuously conveying articles into baths [B65G](#), e.g. [B65G 49/00](#) ; electric devices see the relevant classes, e.g. [H01B](#), [H02G](#))

Definition statement

This subclass/group covers:

- Apparatuses for electroplating and electrolytic conversion plating of [C25D 11/00](#)
- Apparatuses for plating wafers
- Sealing device, cell separation, contacting devices, current directing device, current shielding device, indirect electrode contact.

References relevant to classification in this group

This subclass/group does not cover:

Apparatus for electroless plating	C23C 18/16
Apparatus for electroplating conveyed wires, strips or foils characterised by anodes, diaphragms, conducting rolls, isolating rolls	C25D 7/06
Apparatus for electrophoretic coating	C25D 13/22

Informative references

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

Apparatus for continuously conveying articles into bath	B65G 49/00
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Special rules of classification within this group

Electrolytic coating plants are classified in this group, **C25D19/00** is not used.

Apparatus for electroplating metallic strips or foils are classified in [C25D 7/06](#) subgroups only when relevant subgroups, e.g. radial cells, are available. If no relevant subgroups are available, then apparatus for electroplating metallic strips or foils are classified in [C25D 7/06](#) or [C25D 7/06](#) and [C25D 17/00](#)

subgroups

Apparatus for electroplating tubes, hollow bodies are classified in [C25D 7/04](#)

C25D 17/08

Racks

Definition statement

This subclass/group covers:

Racks, for supporting, not suspending.

C25D 17/10

Electrodes

Definition statement

This subclass/group covers:

Electrodes (composition, counter electrode).

Special rules of classification within this subclass

This group is the principal group for electrodes. If the electrode concerns an electrode for electroplating, electrolytic coating by surface reaction or electrophoretic coating, it is then also classified in those groups.

Synonyms and Keywords

In patent documents the following expression/words "barrels" and "drums" are often used as synonyms.

C25D 19/00

Electrolytic coating plants

Special rules of classification within this group

This group is not used anymore.

It's covered by Apparatuses for electroplating, [C25D 17/00](#).

C25D 21/00

Processes for servicing or operating cells for electrolytic coating

Relationship between large subject matter areas

Processes and apparatus for electrolytic production or recovery of metals and alloys from solutions or melts are classified in [C25C](#)

- Processes and apparatuses for electrochemical removal of materials from object, e.g. etching, polishing, brightening are classified in [C25F](#).

Informative references

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

Measuring thickness of coating	G01B 11/06
Measuring thickness of coating with piezo, capacity, magnetically	G01B 7/06 , G01B 7/08 , G01B 7/10
Measuring thickness of coating with radiation	G01B 15/02
Measuring thickness of coating with sonic vibration	G01B 17/02
Arrangements for measuring current density	G01R 19/08
pH sensor or regulator	G01N 27/416
Process control or regulation in general	G05B

C25D 21/04

Removal of gases or vapours

Definition statement

This subclass/group covers:

Removal of gases or vapours and pressure control in general.

C25D 21/06

Filtering

Definition statement

This subclass/group covers:
Filtering particles, not ions.

C25D 21/10

Agitating of electrolytes; Moving of racks

Definition statement

This subclass/group covers:
Agitating of electrolytes, e.g. for dispersing particles, how to move the electrolyte.

Moving of racks.

Special rules of classification within this subclass

Electroplating with moving electrolyte is classified in [C25D 5/08](#).

C25D 21/22

by ion-exchange

Definition statement

This subclass/group covers:
Regenerations of process solutions by ion exchange, filtering ions, not particles

Synonyms and Keywords

In patent documents the following expression/words "regeneration" and "replenish" are often used as synonyms.