MICROSTRUCTURAL TECHNOLOGY; NANOTECHNOLOGY

B81B MICROSTRUCTURAL DEVICES OR SYSTEMS, e.g. MICROMECHANICAL DEVICES (piezo-electric, electrostrictive or magnetostrictive elements per se H01L 41/00)

NOTES
1. This subclass does not cover:
   • purely electrical or electronic devices per se which are covered by section H, e.g. subclass H01L;
   • purely optical devices per se which are covered by subclasses G02B or G02F;
   • essentially two-dimensional structures, e.g. layered products which are covered by subclass B32B;
   • chemical or biological structures per se which are covered by section C;
   • structures in atomic scale produced by manipulation of single atoms or molecules, which are covered by group B82B 1/00.

2. Devices or systems classified in this subclass are also classified in appropriate subclasses providing for their structural or functional features, if such features are of interest.

3. Attention is drawn to the following places:
   A61K 9/50 Microcapsules for medicinal preparations
   B25J 7/00 Micromanipulators
   G02B 21/32 Micromanipulators combined with microscopes
   G11B 5/127 Magnetic heads
   H01P 3/08 Waveguide microstrips.

4. In this subclass, local "residual" subgroups, e.g. B81B 7/0077, are used with the following purpose:
   When classifying a document which does not fit in any of a set of subgroups with the same dot-level, the document should be classified in the residual group, if present, and not in the group at the hierarchical level one dot above.
   In the example, the document shall be classified in B81B 7/0077 and not in B81B 7/0032 as B81B 7/0077 is "residual" to B81B 7/0035-B81B 7/0074.
3/0048 . . . [Constitution or structural means for controlling angular deflection not provided for in groups B81B 3/0043 - B81B 3/0045]

3/0051 . . . [For defining the movement, i.e. structures that guide or limit the movement of an element (mechanical arrangements for preventing or damping vibration or shock H01H 3/960)]

3/0054 . . . [For holding or placing an element in a given position]

3/0062 . . . [Devices moving in two or more dimensions, i.e. having special features which allow movement in more than one dimension]

3/0064 . . . [Constitution or structural means for improving or controlling the physical properties of a device]

3/0067 . . . [Mechanical properties]

3/007 . . . [For controlling stiffness, e.g. ribs]

3/0072 . . . [For controlling internal stress or strain in moving or flexible elements, e.g. stress compensating layers]

3/0075 . . . [For improving wear resistance]

3/0078 . . . [Constitution or structural means for improving mechanical properties not provided for in B81B 3/0007 - B81B 3/0056]

3/0081 . . . [Thermal properties]

3/0083 . . . [Optical properties]

3/0086 . . . [Electrical characteristics, e.g. reducing driving voltage, improving resistance to peak voltage]

3/0089 . . . [Chemical or biological characteristics, e.g. layer which makes a surface chemically active]

3/0091 . . . [Magnetic properties, e.g. guiding magnetic flux]

3/0094 . . . [Constitution or structural means for improving or controlling physical properties not provided for in B81B 3/0007 - B81B 3/0009]

3/0097 . . . [Devices comprising flexible or deformable elements not provided for in groups B81B 3/0002 - B81B 3/0004]

5/00 Devices comprising elements which are movable in relation to each other, e.g. comprising slidable or rotatable elements

7/00 Microstructural systems; [Auxiliary parts of microstructural devices or systems]

7/0003 . . . [MEMS mechanisms for assembling automatically hinged components, self-assembly devices (self-assembly processes B81C 1/00007)]

7/0006 . . . [Interconnects]

7/0009 . . . [Structural features, others than packages, for protecting a device against environmental influences (B81C 1/00077 takes precedence)]

7/0012 . . . [Protection against reverse engineering, unauthorised use, use in unintended manner, wrong insertion or pin assignment]

7/0016 . . . [Protection against shocks or vibrations, e.g. vibration damping]

7/0019 . . . [Protection against thermal alteration or destruction (B81B 7/0083 takes precedence)]

7/0022 . . . [Protection against electrostatic discharge (electrostatic discharge protection for electronic semiconductor circuits H01L 27/0248; circuit arrangements for protecting electronic switching circuits used for pulse technique against overcurrent or overvoltage H03K 17/008)]

7/0025 . . . [Protection against chemical alteration]

7/0029 . . . [Protection against environmental influences not provided for in groups B81B 7/0012 - B81B 7/0023]

7/0032 . . . [Packages or encapsulation (processes for packaging MEMS B81C 1/00261; packaging of smart-MEMS B81C 1/0023)]

7/0035 . . . [for maintaining a controlled atmosphere inside of the chamber containing the MEMS]

7/0038 . . . [using materials for controlling the level of pressure, contaminants or moisture inside of the package, e.g. getters]

7/0041 . . . [maintaining a controlled atmosphere with techniques not provided for in B81B 7/0038]

7/0045 . . . [for reducing stress inside of the package structure]

7/0048 . . . [between the MEMS die and the package substrate]

7/0051 . . . [between the package lid and the substrate]

7/0054 . . . [between other parts not provided for in B81B 7/0048 - B81B 7/0051]

7/0058 . . . [for protecting against damages due to external chemical or mechanical influences, e.g. shocks or vibrations]

7/0061 . . . [suitable for fluid transfer from the MEMS out of the package or vice versa, e.g. transfer of liquid, gas, sound]

7/0064 . . . [for protecting against electromagnetic or electrostatic interferences]

7/0067 . . . [for controlling the passage of optical signals through the package]

7/007 . . . [Interconnections between the MEMS and external electrical signals]

7/0074 . . . [3D packaging, i.e. encapsulation containing one or several MEMS devices arranged in planes non-parallel to the mounting board]

7/0077 . . . [Other packages not provided for in groups B81B 7/0035 - B81B 7/0074]

7/008 . . . [MEMS characterised by an electronic circuit specially adapted for controlling or driving the same (B81B 7/0087 takes precedence; arrangements for starting, regulating, braking, or otherwise controlling an actuator H02N; control arrangements or circuits for visual indicators G09G 3/00)]

NOTES
1. This group covers only MEMS with an electronic circuit which is not specific to a particular application.

2. This group does not cover electronic circuits per se, e.g. for controlling or driving application specific MEMS

7/0083 . . . [Temperature control]

7/0087 . . . [On-device systems and sensors for controlling, regulating or monitoring]

7/009 . . . [Maintaining a constant temperature by heating or cooling]

7/0093 . . . [by cooling]

7/0096 . . . [by heating]
Basic microelectromechanical structures

Suspended structures, i.e. structures allowing a movement

Bridges

Cantilevers

Diaphragms, i.e. structures separating two media that can control the passage from one medium to another; Membranes, i.e. diaphragms with filtering function

Comb structures

Flexible holders

Torsion bars

Spring holders

Flexible holders not provided for in

See-saws

characterized by their profile

Static structures

Anchors

Cavities

Grooves

Trenches

Channels

Grooves not provided for in

Holes

Tips, pillars

characterized by their profile

rounded profile

sloped profile

profiles not provided for in

Electrodes

Type of movement

Translation according to an axis parallel to the substrate

Translation according to an axis perpendicular to the substrate

Translation in a plane parallel to the substrate, i.e. enabling movement along any direction in the plane

Rotation in a plane parallel to the substrate

Rotation out of a plane parallel to the substrate

Devices comprising elements which are movable in relation to each other, e.g. slidable or rotatable

Microstructural systems or auxiliary parts thereof

comprising a micromechanical device connected to control or processing electronics, i.e. Smart-MEMS

the micromechanical device and the control or processing electronics being separate parts in the same package

the micromechanical device and the control or processing electronics being integrated on the same substrate

Smart-MEMS not provided for in

Electronic circuits for micromechanical devices which are not application specific, e.g. for controlling, power supplying, testing, protecting

Arrays
of movable structures
of static structures
Interconnects
Packages
. Arrangements for connecting external electrical signals to mechanical structures inside the package
. Buried interconnects in the substrate or in the lid
. Conductive package seal
. Feed-through, via
. through the lid
. through the substrate
. Interconnects arranged on the substrate or the lid, and covered by the package seal
. Arrangements not provided for in groups

Structural features, others than packages, for protecting a device against environmental influences

Protective layers applied directly to the device before packaging

Microstructural systems or auxiliary parts thereof not provided for in