★★★＜第１４回知的財産翻訳検定試験【第８回和文英訳】＞★★★

<<１級／化学>>

問 1

2. A method for producing a substrate in which a resist layer is patterned on a surface of a base substrate, the method comprising the steps of:

coating the base substrate with a chemically amplified resist to form the resist layer covering the surface of the base substrate;

irradiating a portion of the resist layer with ultraviolet light through a mask having a predetermined pattern to generate a chemically active species in the irradiated portion;

heating the resist layer to promote a chemical reaction catalyzed by the chemically active species, so that a region whose solubility in a developer has been changed is formed in the resist layer; and

developing the resist layer with the developer so that the region of the resist layer is selectively left or removed.

問 2

[0002]

Electrically conductive particles having a size of several nanometers (hereafter referred to as nanoparticles) have chemical, optical, and electromagnetic properties that are not observed in particles having a size larger than 1 micrometer and hence have been attracting attention. Nanoparticles are expected to be applied to, for example, catalyst materials for chemical reactions and magnetic powders for magnetic recording media.

[0003]

In general, nanoparticles are produced by a gas-phase process or a liquid-phase process. Issues faced in both of these processes are enhancing the quality of the resultant nanoparticles and increasing the productivity. The liquid-phase process is advantageous in that a large amount of nanoparticles can be easily produced without the need for substrates, but has the drawbacks that impurity contamination tends to occur and control of the nanoparticle shape is difficult.

問 3

[0028]

The slab obtained by casting method A has a large thickness, and the cooling rate in the metal structure is relatively low at 0.5 to 20 K/s, and thus intermetallic compounds, such as alloy M, that crystallize in the central portion of the slab may have a size reaching 5 to 50 micrometers. In this case, peeling may occur between the intermetallic compounds and the matrix during plastic deformation of the final annealed plate. In contrast, when the casting apparatus of the present embodiment is used, the slab thickness can be controlled so as to be reduced, and the cooling rate in the regions extending to a depth of one-fifth of the plate thickness below the surfaces can be increased to 15 to 150 K/s, and therefore, the particle diameter of intermetallic compounds in the regions at a depth of 5 to 25 micrometers below the plate surfaces of the final annealed plate becomes 2 micrometers or less.

問 4

Example: Production of isopropyl (-)-cis-2-aminocyclohexanecarboxylate methanesulfonate

To a solution of 100 mmol of isopropyl cyclohexanone-2-carboxylate in 150 ml of methanol, 500 mmol of ammonium formate was added. After the resulting mixture was heated under reflux for 24 hours, the mixture was cooled to room temperature, and the solvent was distilled off under reduced pressure. To the residue, 50 ml of ethyl acetate and 30 ml of water were added, and then the organic layer was separated and dried over sodium sulfate. After the solvent was removed under reduced pressure, the residue was crystallized from methanol to give isopropyl 2-amino-1-cyclohexenecarboxylate as white crystals.

Under a nitrogen atmosphere, 10 mmol of isopropyl 2-amino-1-cyclohexenecarboxylate thus obtained, 10 mmol of methanesulfonic acid, 0.1 mmol of a Ru catalyst, and 8 ml of methanol were placed in a stainless steel autoclave, and the mixture was kept at 333 K under 3 MPa pressure of hydrogen for 16 hours with stirring to give isopropyl (-)-cis-2-aminocyclohexanecarboxylate methanesulfonate.