Thus, the invention is directed to a cleaning liquid for removing cerium oxide remaining on the surface of the object to be cleaned, which includes (1) hydrogen fluoride and (2) at least one ammonium salt selected from the group consisting of ammonium chloride, ammonium nitrate, ammonium sulfate, tetramethylammonium chloride, tetramethylammonium nitrate, and tetramethylammonium sulfate.

[0013]

In one embodiment, there is provided a cleaning liquid for removing cerium oxide remaining on a surface of an object to be cleaned, comprising:

(1) hydrogen fluoride; and

(2) at least one ammonium salt selected from the group consisting of ammonium chloride, ammonium nitrate, and ammonium sulfate.

In one embodiment, there is provided a cleaning method, comprising bringing a cleaning liquid into contact with a surface of an object on which cerium oxide is deposited, so that the cerium oxide is dissolved to form cerium ions and removed, wherein

the cleaning liquid comprises:

(1) hydrogen fluoride; and

(2) at least one ammonium salt selected from the group consisting of ammonium chloride, ammonium nitrate, and ammonium sulfate.

When a cleaning liquid containing hydrogen fluoride is used, cerium oxide can be dissolved to form cerium ions. However, dissolved cerium ions can be deposited again as impurities on the surface of the object being cleaned, so that the cerium component becomes difficult to be removed. The inventors have found that a cleaning liquid containing hydrogen fluoride and a specific ammonium salt can stabilize and keep cerium ions being dissolved in the cleaning liquid and efficiently remove them from the surface of the object being cleaned. In addition, the cleaning liquid of the invention does not contain an acid such as sulfuric acid, nitric acid, or phosphoric acid as a main ingredient in contrast to conventional cleaning liquids. Therefore, the cleaning liquid of the invention can suppress corrosion of various metal materials. As used herein, the term "cerium ions" means Ce^{3+}, Ce^{4+}, hydrates thereof, or complex ions thereof.