WHAT IS CLAIMED IS:

1. A polishing unit (300) comprising:

a polishing table (350) to which a polishing pad (352) for polishing a substrate is attached;

a top ring (302) for holding the substrate to press the substrate against the polishing pad (352);

a light emitting member (371) for emitting a light to a detection area (372) on the polishing pad (352);

a slip-out detector (370) for detecting a slip out of the substrate from the top ring (302) based on the light reflected from the detection area (372); and

an elimination mechanism (380) for eliminating a polishing liquid flowing into the detection area (372) ,

wherein the slip-out detector (370) is configured to detect the slip out of the substrate from the top ring (302) based on a difference between a reference color and a color of light reflected from the detection area (372) of the polishing pad (352) during a polishing process,

wherein the polishing unit (300) is configured to count a cumulative number of polishing processes of the substrate,

wherein the polishing unit (300) is configured to reset the reference color of the slip-out detector (370) and automatically reregister the reference color based on the light reflected from the detection area (372) when the counted cumulative number of polishing processes exceeds a threshold value,

wherein the slip-out detector (370) is configured to detect the slip out of the substrate from the top ring (302) based on a difference between the reregistered reference color and a color of light reflected from the detection area (372) of the polishing pad (352) during a polishing process.

2. The polishing unit (300) according to claim 1, wherein

the slip-out detector (370) is configured to detect the slip out of the substrate from the top ring (302) based on a change of an amount of the light reflected from the detection area (372) in addition to the difference between the reference color or the reregistered reference color and a color of the light reflected from the detection area (372) of the polishing

pad (352) during a polishing process.

3. The polishing unit (300) according to any one of claims 1 to 2, wherein

the elimination mechanism (380) includes a purge mechanism (384) for spraying a fluid to the detection area (372) to eliminate the polishing liquid flowing into the detection area (372).

4. The polishing unit (300) according to any one of claims 1 to 2, wherein

the elimination mechanism (380) includes a suction mechanism (388) for suctioning the polishing liquid flowing into the detection area (372) to eliminate the polishing liquid flowing into the detection area (372).

5. The polishing unit (300) according to any one of claims 1 to 4, wherein

the light emitting member (371), the slip-out detector (370), and the elimination mechanism (380) are disposed to each of a plurality of detection areas (372) on the polishing pad (352).

6. The polishing unit (300) according to any one of claims 1 to 4, wherein

the light emitting member (371), the slip-out detector (370), and the elimination mechanism (380) are mounted to the top ring (302).

7. A substrate processing apparatus (1000) comprising:

the polishing unit (300) for polishing a substrate according to any one of claims 1 to 6;

a conveyance unit (200) for conveying the substrate; and

a drying unit (500) for drying the substrate.

8. A polishing method comprising:

a polishing step of polishing a substrate by flowing a polishing liquid on a polishing pad (352) that polishes the substrate;

a detecting step of emitting a light to a detection area (372) on the polishing pad (352) and detecting a slip out of the substrate from a top ring (302) based on the light reflected from the detection area (372); and

an eliminating step of eliminating the polishing liquid flowing into the detection area (372),

wherein the detecting step includes detecting the slip out of the substrate from the top ring (302) based on a difference between a reference color and a color of the light reflected from the detection area (372) of the polishing pad (352) during a polishing process,

the detecting step further includes:

counting a cumulative number of polishing processes of the substrate;

resetting the reference color and automatically reregistering the reference color based on the light reflected from the detection area (372) of the polishing pad (352) when the counted cumulative number of polishing processes exceeds a threshold value; and

detecting the slip out of the substrate from the top ring (302) based on a difference between the reregistered reference color and a color of the light reflected from the detection area (372) of the polishing pad (352) during a polishing process.