CLAIMS

1. A focus adjustment method for a substrate coating step using a working device that includes:

a work table on which a substrate is placed;

an image capture device not having an autofocus function;

a discharge device including a nozzle;

an attachment member that couples the image capture device and the discharge device;

an XYZ drive device that moves the work table and the image capture device and the discharge device relative to each other;

a storage device that stores images captured by the image capture device;

a display device including an image display region that has a plurality of divided regions;

an input device allowing arbitrary one of the divided regions in the image display region to be specified;

an in-focus determination device that executes image processing on the plurality of captured images having been stored in the storage device, and that determines an in-focus image on the basis of contrasts of the captured images; and

a control device that controls operations of the image capture device and the XYZ drive device,

wherein the substrate is a substrate on which a plurality of objects having different heights are arranged on a surface of the substrate,

wherein the focus adjustment method comprises:

a first step of obtaining a partial captured image in which a

portion of the substrate is captured by the image capture device, and displaying the partial captured image in the image display region of the display device;

a second step of obtaining the plurality of captured images for a portion of the substrate corresponding to one divided region of the image display region, the one divided region being selected by a user through the input device, while the image capture device and the discharge device are ~~is~~ moved in an up and down direction relative to the substrate, storing the plurality of captured images in the storage device, and causing the in-focus determination device to perform in-focus image determination on the captured images having been stored; and

a third step of displaying the captured image, which has been determined as the in-focus image, in the image display region,

wherein, in the first step, an image of a portion of the substrate is captured such that the captured image includes at least two of the objects having different heights,

in the second step, the captured images are continuously obtained while the image capture device and the discharge device are moved in the up and down direction relative to the substrate, the captured images are stored in the storage device together with coordinate values in the up and down direction at times when the images are captured, ones of the captured images in the one divided region selected by the user, the ones satisfying a determination reference value, are determined as in-focus images, and an in-focus identification flag is assigned to each of the captured images satisfying the determination reference value, and

in the third step, the captured images each assigned with the in-focus identification flag are all displayed in an arrayed state.

~~2. The focus adjustment method according to claim 1, wherein the substrate is a substrate on which a plurality of objects having different heights are arranged on a surface of the substrate, and~~

~~an image of a portion of the substrate is captured in the first step such that the captured image includes at least one of the objects.~~

~~3. The focus adjustment method according to claim 2, wherein, in the first step, an image of a portion of the substrate is captured such that the captured image includes at least two of the objects.~~

2. The focus adjustment method according to claim 1, wherein, in the second step, the image capture device and the discharge device are moved downward to acquire the captured images after being raised through a distance in consideration of the heights of the objects.

3~~4~~. The focus adjustment method according to claim 1 or 2 ~~2 or 3~~, wherein at least one of the objects is rectangular and a corner of the rectangular is set as a coating start reference position, and the image display region is divided into four equal divided regions.

~~5. The focus adjustment method according to claim 2, wherein, in the second step, the captured images are continuously obtained while the image capture device is moved in the up and down direction relative to the substrate, the captured images are stored in the storage device together with coordinate values in the up and down direction at times when the images are captured, one of the captured images in the one divided region selected by the user, the one having a peak in contrast, is determined as an in-focus image, an in-focus identification flag is assigned to the captured image having been determined as the in-focus image, and movement of and image-capturing by the image capture device are stopped.~~

~~6. The focus adjustment method according to claim 3, wherein, in the second step, the captured images are continuously obtained while the image capture device is moved in the up and down direction relative to the substrate, the captured images are stored in the storage device together with coordinate values in the up and down direction at times when the images are captured, ones of the captured images in the one divided region selected by the user, the ones satisfying a determination reference value, are determined as in-focus images, and an in-focus identification flag is assigned to each of the captured images having been determined as the in-focus images, and~~

~~in the third step, the captured images each assigned with the in-focus identification flag are all displayed in an arrayed state.~~

4~~7~~. The focus adjustment method according to any one of claims 1 to 3 ~~6~~, wherein height information of an in-focus object in each of the in-focus images is displayed together in the third step.

5~~8~~. A working device comprising:

a work table on which a substrate is placed;

an image capture device not having an autofocus function;

a discharge device including a nozzle;

an attachment member that couples the image capture device and the discharge device;

an XYZ drive device that moves the work table and the image capture device and the discharge device relative to each other;

a storage device that stores images captured by the image capture device;

a display device including an image display region that has a plurality of divided regions;

an input device allowing arbitrary one of the divided regions in the image display region to be specified;

an in-focus determination device that executes image processing on the plurality of captured images having been stored in the storage device, and that determines an in-focus image on the basis of contrasts of the captured images; and

a control device that controls operations of the image capture device and the XYZ drive device,

wherein the substrate is a substrate on which a plurality of objects having different heights are arranged on a surface of the substrate,

wherein the control device controls ~~the image capture device~~ to obtain a partial captured image in which a portion of the substrate is captured such that the partial captured image includes at least two of the objects having different heights by the image capture device, and executes control to display the partial captured image in the image display region of the display device and to display the plurality of divided regions in the image display region of the display device;

the control device executes control to obtain the plurality of captured images for a portion of the substrate corresponding to one divided region of the image display region, the one divided region being selected by a user through the input device, while the image capture device and the discharge device are ~~is~~ moved in an up and down direction relative to the substrate, to store the plurality of captured images in the storage device, and to cause the in-focus determination device to perform in-focus image determination on the captured images having been stored; ~~and~~

in the in-focus image determination, the captured images are continuously obtained while the image capture device and the discharge device are moved in the up and down direction relative to the substrate, the captured images are stored in the storage device together with coordinate values in the up and down direction at times when the images are captured, ones of the captured images in the one divided region selected by the user, the ones satisfying a determination reference value, are determined as in-focus images, and an in-focus identification flag is assigned to each of the captured images satisfying the determination reference value; and

the control device executes control to display all the captured images, which have ~~has~~ been determined as the in-focus image and assigned with the in-focus identification flag, in the image display region of the display device in an arrayed state.

~~9. The working device according to claim 8, further comprising a discharge device including a nozzle, and an attachment member that couples the discharge device and the XYZ drive device.~~

6~~10~~. The working device according to claim 5 ~~8 or 9~~, wherein the display device is a display device including a touch panel, and

the input device is constituted by buttons displayed on the touch panel.

7. The working device according to claim 5 or 6, wherein the control device executes control to move the image capture device and the discharge device downward to acquire the captured images after being raised through a distance in consideration of the heights of the objects.

8. The working device according to any one of claims 5 to 7, wherein the control device executes control to display height information of an in-

focus object in each of the in-focus images together in the image display region.