CLAIMS

What is claimed is:

1. A bag opening method configured to open a protective bag of a semiconductor ~~material~~article, wherein the semiconductor ~~material~~article includes the protective bag, an accommodating box, and at least one tape, the protective bag includes an accommodating space and an opening, the accommodating box is disposed in the accommodating space through the opening, the protective bag is configured to have a packaging portion and a non-packaging portion, the packaging portion covers an outer periphery of the accommodating box, the non-packaging portion is folded into a tail structure, the at least one tape is adhered to the packaging portion and the tail structure, and the at least one tape is configured to fix the tail structure to the packaging portion, the bag opening method comprising:

a positioning step implemented by fixing the semiconductor ~~material~~article;

a first cutting step implemented by controlling a first knife machine to cut off the at least one tape, so that the tail structure is in a movable state;

a pulling step implemented by controlling a pulling machine to hold the tail structure and to allow the tail structure to be vertically disposed relative to the non-packaging portion; and

a second cutting step implemented by controlling a second knife machine to cut off a portion connecting the tail structure and the packaging portion, so that the tail structure and the packaging portion are separated.

2. The bag opening method according to claim 1, further comprising a

pushing step between the first cutting step and the pulling step, wherein the pushing step is implemented by controlling the first knife machine to extend between the tail structure and the packaging portion and to push the tail structure for unfolding at least one portion of the tail structure, so that an inner portion of the tail structure is exposed.

3. The bag opening method according to claim 1, wherein, in the pulling step, after a plurality of suction assemblies of the pulling machine are controlled to suck onto the tail structure, a rotatable structure of the pulling machine is controlled to rotate a supporting structure, so that the suction assemblies connected to the supporting structure rotate the tail structure relative to the packing portion, and the tail structure is vertically disposed relative to the packaging portion.

4. The bag opening method according to claim 3, wherein, in the pulling step, when the tail structure is vertically disposed relative to the packaging portion, a clamping device of the pulling machine is controlled to clamp the non-packaging portion, and then the clamping device is controlled to move in a direction away from the packaging portion, so as to pull the tail structure.

5. A bag opening apparatus configured to open a protective bag of a semiconductor ~~material~~article, wherein the semiconductor ~~material~~article includes the protective bag, an accommodating box, and at least one tape, the protective bag includes an accommodating space and an opening, the accommodating box is disposed in the accommodating space through the

opening, the protective bag is configured to have a packaging portion and a non-packaging portion, the packaging portion covers an outer periphery of the accommodating box, the non-packaging portion is folded into a tail structure, the at least one tape is adhered to the packaging portion and the tail structure, and the at least one tape is configured to fix the tail structure to the packaging portion, the bag opening apparatus comprising:

a processing device;

a fixing machine electrically connected to the processing device and configured to fix the semiconductor ~~material~~article;

a first knife machine electrically connected to the processing device and configured to cut off the at least one tape;

a pulling machine electrically connected to the processing device, wherein the processing device is configured to control the pulling machine to hold the tail structure, so that the tail structure is vertically disposed relative to the packaging portion; and

a second knife machine electrically connected to the processing device and configured to cut off the tail structure,

wherein the processing device is configured to sequentially control the fixing machine and the first knife machine, so as to fix the semiconductor ~~material~~article in place and then cut off the at least one tape, and wherein the processing device is configured to sequentially control the pulling machine and the second knife machine, so as to pull the tail structure and then cut off a portion connecting the tail structure and the packaging portion.

6. The bag opening apparatus according to claim 5, further comprising a transferring machine, wherein the transferring machine includes a rail and a carrying platform, the carrying platform is controllable by the processing device to move along the rail, the fixing machine is disposed on the carrying platform, the fixing machine includes four pushing devices, each of the pushing devices includes a driver and a pushing member, the driver of each of the pushing devices is electrically connected to the processing device, and in each of the pushing devices, the pushing member is connected to the driver, and wherein, when the semiconductor ~~material~~article is disposed on the carrying platform, the processing device is configured to control the four pushing devices to be operated, so that the four pushing devices push against four side surfaces of the semiconductor ~~material~~article.

7. The bag opening apparatus according to claim 5, further comprising two abutting devices, wherein each of the two abutting devices includes a driver and an abutting member, the driver of each of the abutting devices is electrically connected to the processing device, and in each of the abutting devices, the abutting member is connected to the driver, wherein the processing device is configured to control the two drivers of the abutting devices to be operated, so that the two abutting members of the abutting devices abut against the packaging portion, and wherein, before the processing device controls the pulling machine to hold the tail structure, the processing device is configured to control the two abutting devices to abut against the packaging portion.

8. The bag opening apparatus according to claim 5, wherein the first knife machine includes a first knife, the first knife includes a main body, the main body has two blades and a protrusion structure at a side thereof, and the protrusion structure is arranged between the two blades, and wherein the processing device is configured to control the first knife blade to be operated, so that the protrusion structure pushes the tail structure that is in a movable state and the tail structure flips relative to the packaging portion.

9. The bag opening apparatus according to claim 5, wherein the pulling machine includes a flipping device, the flipping device includes a movement module, a rotatable module, a supporting structure, and a plurality of suction assemblies, the movement module and the rotatable module are electrically connected to the processing device, the movement module is connected to the rotatable module, the supporting structure is connected to the rotatable module, the rotatable module is controllable by the processing device to rotate the supporting structure, and the suction assemblies are fixed to the supporting structure, wherein the processing device is configured to control the movement module to move the suction assemblies onto the tail structure that is in the movable state, and wherein, after the processing device controls the suction assemblies to suck on the tail structure, the processing device is configured to control the rotatable module to rotate the tail structure relative to the packaging portion, so that the tail structure is vertically disposed relative to the packaging portion.

10. The bag opening apparatus according to claim 5, wherein the pulling structure includes a clamping device, the clamping device includes a driver and clamper, the processing device is electrically connected to the driver, the clamper is connected to the driver, and the processing device is configured to control the driver so that the clamper clamps the tail structure, or control the driver so that the clamper no longer clamps the tail structure.

11. The bag opening apparatus according to claim 5, wherein the second knife machine includes an abutting device and a knife device, the abutting device includes an abutting board, the knife device includes a connection board, a shell, a second knife, and an extendable machine, the connection board is connected to the shell, the second knife is disposed in the shell, the shell has a thru-hole, the extendable machine is connected to the second knife, the processing device is electrically connected to the extendable machine, and the processing device is configured to control the extendable machine so that the second knife protrudes from the shell through the thru-hole, or control the extendable machine so that the second knife protruding from the shell returns back into the shell, and wherein the processing device is configured to control the second knife machine, so that the abutting board of the abutting device and the connection board of the knife device jointly hold the tail structure.

12. A bag opening system comprising the bag opening apparatus as claimed in any one of claims 5 to 11, a fetching apparatus, and a central control apparatus, wherein the central control apparatus is electrically connected to

the bag opening apparatus and the fetching apparatus, and wherein, when the bag opening apparatus cuts off the tail structure of the semiconductor ~~material~~article from the packaging portion, the central control apparatus is configured to control the fetching apparatus to take out the accommodating box disposed in the packaging portion.

13. The bag opening system according to claim 12, further comprising a bag recycling apparatus, wherein the bag recycling apparatus includes at least one movement module, a clamping module, and a platform, the at least one movement module is connected to the clamping module, the clamping module includes two clamping arms and an entering member, the entering member is arranged between the two clamping arms, each of the clamping arms faces toward the entering member, and each of the clamping arms is controllable to move in a direction toward the entering member to clamp the packaging portion, or move in a direction away from the entering member to no longer clamp the packaging portion, wherein the central control apparatus is electrically connected to the bag recycling apparatus, and wherein the central control apparatus is configured to control the clamping module and the at least one movement module to clamp the packaging portion and move the packaging portion to the platform.