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WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H01L 21/00 — A1

(11) International Publication Number: WO 98/50946

(43) International Publication Date: 12 November 1998 (12.11.98)

(21) International Application Number: PCT/US98/09277

(22) International Filing Date: 6 May 1998 (06.05.98)

(30) Priority Data:
08/853,172 8 May 1997 (08.05.97) US

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(81) Designated States: CN, JP, KR, SG, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: MULTIPLE SINGLE-WAFER LOADLOCK WAFER PROCESSING APPARATUS AND LOADING AND UNLOADING METHOD THEREFOR

(57) Abstract

Wafers from plural non-vacuum multiple wafer carriers (25) are loaded and unloaded in an atmospheric front end (32) of a wafer processing machine (30) and transferred to and from the high vacuum chamber (31) of a transfer module (33) of a wafer manufacturing cluster tool (30) through a plurality of single wafer loadlocks (34a–34d). Preferably, with the wafers oriented horizontally throughout, wafers are moved inbound to the high vacuum atmosphere through one loadlock (37a) and moved outbound through another loadlock (37b), the outbound loadlock also actively cooling the wafer. In both the atmospheric and vacuum environments, transfer arms (35, 42) load and unload the loadlocks as often as possible when the other loadlock or loadlocks are sealed, and transfer wafers within the environments when all loadlocks are sealed. Preferably, the wafers are actively cooled in the outbound loadlock (37b). Preferably also, wafers are passed through a wafer aligner (41) after being removed from a carrier (25) and before placed in a loadlock. When wafers from one of the carriers are being moved to and from loadlocks, another of the carriers of processed wafers is being exchanged with a carrier of unprocessed wafers.

