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(71) Applicant *(for all designated States except US)*: **ACM RESEARCH (SHANGHAI) INC.** [CN/CN]; Bld. 4, No. 1690 Cailun Road, Zhangjiang, High-Tech Park, Shanghai 201203 (CN).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **WANG, Hui** [US/CN]; Bld. 4, No. 1690 Cailun Road, Zhangjiang, High-Tech Park, Shanghai 201203 (CN). **WANG, Jian** [CN/CN]; Bld. 4, No. 1690 Cailun Road, Zhangjiang, High-Tech Park, Shanghai 201203 (CN). **MA, Yue** [US/CN]; Room 2202, Building 6, #60, Miaopu Road, Pudong District, Shanghai 201203 (CN). **HE, Chuan** [CN/CN]; Bld. 4, No. 1690 Cailun Road, Zhangjiang, High-Tech Park, Shanghai 201203 (CN).

(74) Agent: **SHANGHAI PATENT & TRADEMARK LAW OFFICE, LLC**; 435 Guiping Road, Xuhui, Shanghai 200233 (CN).

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(54) **Title:** METHODS AND APPARATUS FOR CLEANING SEMICONDUCTOR WAFERS

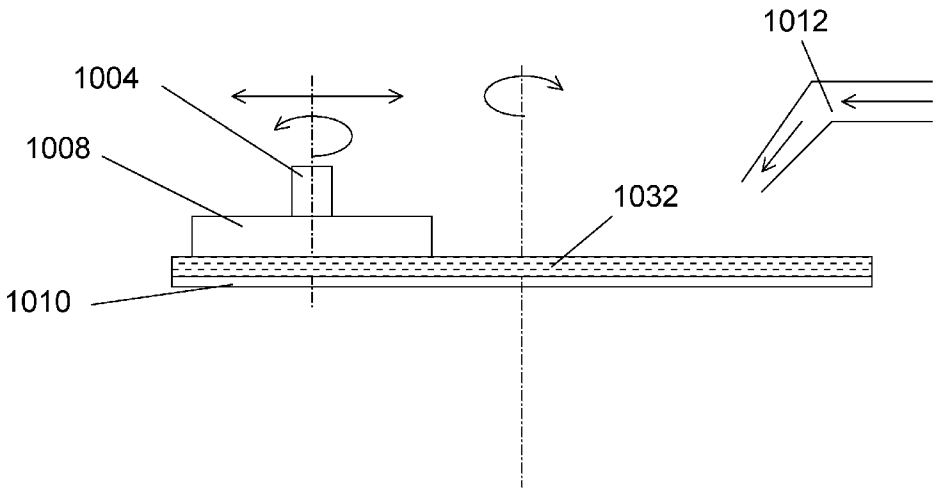


Fig. 1 A

(57) **Abstract:** An apparatus for cleaning a surface of wafer (1010) or substrate includes a plate (1008) being positioned with a gap to surface of the wafer (1010) or substrate, and the plate (1008) being rotated around an axis vertical to surface of the wafer or substrate. The rotating plate surface facing surface of the wafer or substrate has grooves, regular patterns, and irregular patterns to enhance the cleaning efficiency. The apparatus further includes an ultra sonic or mega sonic transducer (3006) vibrating the rotating plate during cleaning process.

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