

Visualization of slurry particle behavior using evanescent field during chemical mechanical polishing

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In chemical mechanical polishing (CMP) process, the substrate surfaces are polished by particles (abrasives) in CMP slurry. It is well known that the slurry particle is as important consumable as a pad.

Generally, it is modeled that the slurry particles are tracked on the contact portion between the substrate and the pad, and exert a polishing action while following the movement of the pad as shown in Fig. 1. However, the polishing mechanism based on the dynamic behavior of slurry particles has not been revealed.

In this study, we visualized the dynamic behavior of the slurry particles using the contact image analysis method utilizing the principle of the evanescent field. Figure 2 shows our developed device for visualizing the dynamic behavior of the slurry particles. Moreover, we analyzed the slurry particle behavior quantitatively, and verified the relationships between the analyzed outcomes and actual polishing test results.

As a result, the slurry particles give the polishing action to the substrate while moving with the pad on and around the contact portions of the pad. Furthermore, it is precious things to increase the contact area of the pad and particles with the CMP slurry to achieve a high removal rate.

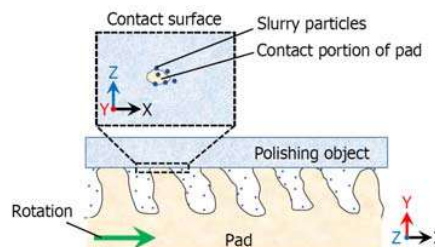


Fig.1 Contact interface model

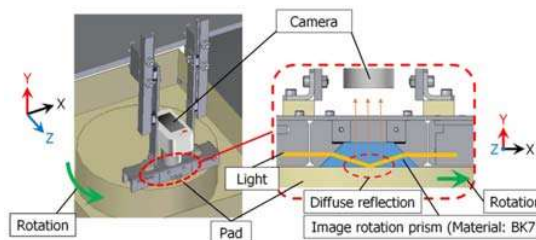


Fig.2 Developed device for visualizing dynamic behavior of slurry particles

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