主　論　文　要　旨

論文題名　**Development of high efficiency polishing using composite abrasives**

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主論文要旨

Cerium oxide (CeO_2) abrasives are widely used in the glass surface polishing process because a high removal rate and smooth glass surfaces can be obtained. Therefore, the technologies to reduce the cost of mirror finish using CeO_2 abrasives are strongly required. The polymer-CeO_2 composite abrasive was proposed to improve polishing performance and to reduce cleaning time of polished surface. The composite abrasive has a core-shell structure in which a polymer particle forms a core and a CeO_2 layer covers the polymer particle. The removal rate using composite abrasives was improved 20% compared with that of conventional polishing. This is due to normal force per abrasive was increased by reduction of contact area between workpiece and polishing pad surface. In addition, the loose abrasives which were not adhere to polymer particles were removed by wet classification. Cleaning time of polished surface was significantly reduced by removal of loose abrasives from slurry of composite abrasives. Furthermore, the dispersibility of composite abrasives has been improved compared with conventional abrasives. We employed dimpled polymer particles as core particles for improving stagnation of composite abrasives. The removal rate using composite abrasives that employed dimpled particles as core particles is 50% higher than that of conventional polishing. In addition, the particles to inhibit movement of composite abrasives after classification were employed. As a result, polishing characteristics of composite abrasives were increased because stagnation of composite abrasives was improved. We investigated effect of pore diameter of porous polishing pad on polishing characteristics using composite abrasives. The removal rate using polishing pad with average pore diameter of 60μm was approximately two times higher than that of polishing using polishing pad with average pore diameter of 200μm.