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# Development of Green Chemical Mechanical Planarization (CMP) Process using Minimum Quantity Slurry Mist

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## Extended Abstract

Chemical mechanical planarization (CMP) is one of the most powerful process to realize next generation semiconductor devices including 3D heterogeneous structures and several nanometer line width. In CMP industry, reduction of slurry consumption without avoiding the drop in productivity is one of the most important requirements for environmental sustainability on [1], [2], and [3]. In this paper, authors propose a spray slurry nozzle to supply minimum quantity slurry mist, which reduce the slurry consumption and increase the material removal rate (MRR) in $SiO_2$ CMP on [4] and [5]. The spray slurry nozzle is compared with a commonly used tube-type slurry nozzle in terms of MRR, material removal uniformity, friction force, and process temperature. A case study on the greenhouse gas (GHG) emission associated with the slurry consumption is provided by polishing patterned wafers on [6]. Adopting the spray slurry nozzle in CMP process provides higher MRR, higher friction force, and shorter process time than the normal tube-type slurry nozzle. Thus, the spray slurry nozzle will diminish the carbon dioxide equivalent (CDE) of [7] and [8] associated with the slurry and electricity consumptions. Furthermore, authors could find that minimum quantity slurry mist decreases the process temperature and it may be used as a cooling system for the CMP process.

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