TECHNOLOGY

# Low Temperature Polymer Bonding Using UV/Ozone Surface Treatment

## OVERVIEW

Researchers at the Department of Mechanical Engineering at the University of Maryland–College Park have invented a new technique called “Low Temperature Polymer Bonding Using UV/Ozone Surface Treatment”. The invention consists of low temperature polymer bonding technique using UV/Ozone bonding in a high bond and zero-deformation technique. The oxidation of poly-(methyl methacrylate) (PMMA) and cyclic olefin copolymer (COC) surfaces by UV/O3 is a simple and effective method for low temperature bonding of thermoplastic substrates. The UV/Ozone bonding has good bonding result on polycarbonate (PC) as well.

While surface oxidation based on O2 plasma treatments have been previously described for enhanced low temperature bonding of thermoplastic substrates, the UV/O3 method offers advantages including low equipment cost, low fabrication cost, high throughput and high yield. In general, the energetic surfaces produced by UV/O3 treatment results in at least 1–2 orders of magnitude improvement in bond strength for both PMMA and COC.

Commercial advantages:
* High strength, zero deformation:
The low-temperature UV/Ozone bonding technique has high bond strength with zero microstructure/channel deformation for polymer micro/nano-device bonding.

* High-yield process:
This UV/Ozone bonding technology is currently been used and tested in our lab (MML) to fabricate polymer-based microfluidic chips more than hundred times with >99% yield during bonding process.

* Simple, low-cost:
UV/Ozone bonding technology is a simple and low-cost fabrication technology. UV/Ozone exposure was performed in an air-filled chamber at atmosphere pressure without vacuuming or filling with any other gaseous inside chamber. Equipment for UV/Ozone treatment was obtained from commercial ozone cleaning system with low equipment cost.

Potential application/commercial interests:
Application of UV/Ozone polymer bonding is broad. UV/Ozone polymer bonding can be applied to any polymer based micro/nano device.

For more information, please contact George Letscher at the Office of Technology Commercialization, University of Maryland College Park, via phone at (301) 405 -3899 or E-mail at letscher@umd.edu.

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## Additional Information

### INSTITUTION

University of Maryland, College Park

### PATENT STATUS

Patent(s) pending

### LICENSE STATUS

Contact OTC for licensing information

### CATEGORIES

- Chemical

### EXTERNAL RESOURCES

- US Patent 8,293,061

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