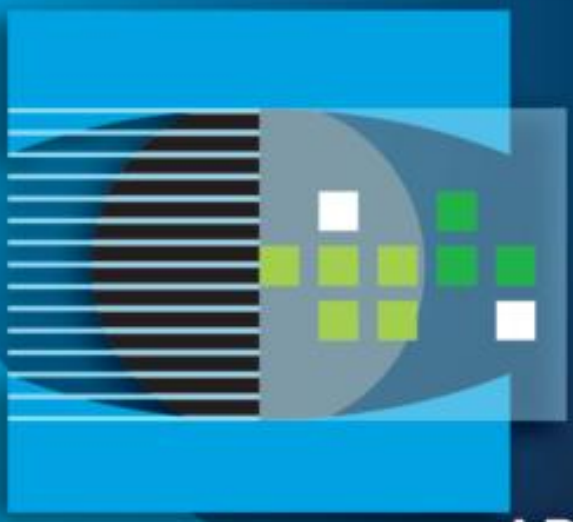
PROGRAM SUMMARY

ARVO 2008 ANNUAL MEETING ■ PROGRAM SUMMARY



# ARVO 2008 ANNUAL MEETING

# Eyes on innovation

■ APRIL 27–MAY 1, 2008

GREATER FORT LAUDERDALE/
BROWARD COUNTY
CONVENTION CENTER

FORT LAUDERDALE, FLORIDA

ARVO

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| **Program#/Poster#:** | 1773/A583 |
| **Abstract Title:** | **Long-Term Reliability of Polyimide Electrode *Array in Rabbit Retina*** |
| **Presentation Start/End Time:** | Monday, Apr 28, 2008, 11:15 AM - 1:00 PM |
| **Location:** | Hall B/C |
| **Reviewing Code:** | 338 retinal prostheses - RE |
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| **Keywords:** | 685 retina, 689 retinal adhesion, 583 low vision |

**Purpose:** Long-term reliability of polyimide-based gold electrode array for retinal prosthesis was evaluated in the rabbit eye for 2 years, and as a result, a novel fabrication process including oxygen plasma treatment and geometrical grid between layers was proposed to improve the reliability of the electrode array.

**Methods:** Polyimide-based gold electrode array was fabricated by previously proposed method (Chung, 2002), and was subretinally implanted in the rabbit eye. After two years of implantation, electrode array was harvested and examined. To investigate the mechanism of changes *in vivo*, it was mimicked by *in vitro* temperature elevation in phosphate buffered saline (PBS: pH7.4). Pressure induction test (blister test) was introduced to measure the strength of adhesion between layers and was done periodically during *in vitro* test. New design ideas to lengthen lifetime were proposed. Several novel steps were introduced between the fabrication processes to enhance the interlayer bonding strength. Oxygen plasma treatment for reactive ion etching was done along the margin of the electrode sites and pads for tight sealing between the layers. Grid design was introduced for increasing contact area between lower and upper layers. Several groups with different size of grid were designed and tested.

**Results:**There was minute delamination between the layers along the edge of the electrode site opening without melting or corrosion of the polyimide or gold material. Delamination mechanism was successfully reproduced by *in vitro* PBS soak test with temperature elevation and blister test helped to analyze the change of adhesion strength according to the time course. Newly proposed fabrication steps, oxygen plasma treatment and geometrical grid, was shown to enhance adhesion strength more than 20(psi) compared to previous art of design.

**Conclusions:** Long-term implantation of polyimide electrode array fabricated by previously proposed method was proved to have some shortcoming *in vivo*, and successfully reproduced by *in vitro* acceleration setup. Proposed oxygen plasma treatment and geometrical grid design was tested and could be successfully used for enhancing long-term stability of the electrode array for artificial retina.

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