Response to Reviewer 1 comments

Point 1: In the introduction part, explain briefly why metal oxide is needed for electrical contact. Is Ag alone not enough? Can metal oxide be replaced with othermaterials?

Response 1: Thank you for this valuable feedback. We have included a brief explanation in paragraph 1 to show the importance of the metal oxide in electrical contacts and why can not use Ag alone. The following has been inserted on page 1 line 33: "Decomposition and evaporation of CdO could significantly resist the welding and erosion of the Ag matrix under the multiple arcs [3]." The description of other materials which is used to replaced CdO has been added on page 1 line 37: "New materials, like Ag/SnO2 [5, 6], Ag/CuO [7, 8], Ag/ZnO [9], Ag/MAX [10, 11], Ag/TiB2 [12], etc.,"

Point 2: Make it more clear on the Y_2O_3powder preparation. For example 1:33 and 1:133 ratios can obtain the particle size in between 200 to 400 nm. Or, please state clearly in section 3.1 thatthe powder with 243, 387, 792 and 980 nm belong to which ratio?

Response 2: Thanks for your comments. We have revised the description of the Y_2O_3powder preparation, please see page 2 from line 85 to line 92.

Point 3:243 nm shows the best performance.Do you think if you go to a smaller size than 243 nm would the results will be better?

Response 3: In our opinion, a smaller size than 243 nm may have better performance in accelerating the arc movement, e.g. nanoscaled Y_2O_3on the cathode surface could provide more movement sites for the arc, which is beneficial for arc extinguishing and reducing the mass loss caused by the ablation. However, if the particle size is further reduced to the nanoscale level, particle aggregation is always a problem, making the powder unable to be homogenously distributed in the Ag matrix. The aggregates are normally much larger in size than that of the primary particles, and as a result, would be detrimental to the anti-arc erosion capability. Furthermore, the aggregate powders are difficult to be densified at the composite sintering temperature, resulting in a lower relative density and poor conductivity of the samples.

Point 4: How are you going to optimize the perfect average size for the Y_2O_3?

Response 4: In the next stage, we will prepare the nanoscaled Y_2O_3. But the first thing is to improve the dispersion of Y_2O_3in the Ag matrixby optimizing the fabrication process. We have discussed the aggregation problems in Response 3. Moreover, for the nanoparticle-reinforced Ag/Y_2O_3electrode contacts, the distance between two Y_2O_3particles is short enough to move the arc continuously. Generally, the size of one arc spot is in micron-or submicron scare. Features of an arc spot, such as the depth and the diameter, are results of arc sputtering, which has a close relationship with the size of the Y_2O_3nano-particles. However, how the relationship exists is still unclear. Therefore, it is necessary to optimize the nanoscaled $Y_2O_3$to reduce the splashing loss.