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The influence of metal vapor deposition on the insulating materials

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The Insulating materials often work in terrible conditions with high temperature and full of metal vapor. For example, the electrical insulator of high voltage circuit breaker repeats breaking the arc frequently, resulting in electrode erosion. Electrode erosion makes the metal vapor and it will be attached to the insulator surface, greatly affecting the Insulation property. This paper mainly adopts the method of combining experiment and simulation in order to figure out the influence. In the early experiments, we can make a preliminary confirmation that the metal vapor can make the performance of insulation materials decrease, and the degree of decline is related to the thickness of metal vapor. We use electrical explosion as the way to produce metal vapor and spray it onto the surface of the insulating material. Changing the parameters in the electrical explosion can make different insulating with different metal thickness. And then, use SEM to observe and scan the surface morphology of insulation specimen. Besides, by measuring the insulating material surface resistance and flashover voltage with instrument, we can make the evaluation and compare for several kinds of insulating materials, such as Teflon, ceramics and polyimide. To make the result more persuasive, we plan to use the simulation software, FLUENT, to simulate the temperature field and velocity field in the electrical explosion. We believe this can explain the relation between the parameters in the electrical explosion and the metal vapor deposition situation. At last, we provide the advice to reduce the influence of metal vapor deposition based on the experimental result.

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