

About the condensation-ionization instability in aerosol plasma

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As shown in [1], the bulk condensation of supersaturated vapor can be connected to formation of aerosol plasma if droplets are capable to emit the electrons in appreciable quantity at temperature of condensation. Influence of the charged particles (ions and electrons) on the process of condensation of supersaturated vapor variously depending on a supersaturation ratio. If the specified value less critical [2] this influence is shown in increase of nucleation rate, connected to decrease of work of formation of embryos in case of connection to a embryos of an ion or electron. As have shown the calculations which have been carried out in [1] on the basis of Thomson model [2] with use of results [3], influence it is insignificant and masks uncertainty of such values, as a condensation coefficient or a constant of coagulation. At the same time in case of excess of a supersaturation ratio of the critical value takes place the barrier less growth of the embryos at presence at them an electric charge. Work of Wilson chamber is based on this principle [2]. Hence, if at downturn of temperature of vapor achieves a supersaturation ratio below critical value it results in formation of droplets by nucleation mechanism. In a turn, formed droplets emit the electrons which at achievement of supercritical supersaturation become the centers of condensation for formation of new droplets and to emit the additional electrons. Thus, transition on exponential growth of number of droplets and electrons is possible. The specified situation in our work is characterized as condensation-ionization instability. On the basis of results of works [1, 2, 4] the appropriate estimations determining an opportunity of transition to described instability in aerosol plasma are made.

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References

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