RADIATION EMISSION BY NANOPARTICLES IN HETEROGENEOUS PLASMA WITH A CONDENSED DISPERSED PHASE

V.I. Marenkov

I.I. Mechnikov Odessa National University
(*2, Dvoryanska Str., Odessa 65026, Ukraine;*
e-mail: maren0@ukr.net)

S u m m a r y

In the framework of the statistical "cell" approach to the description of the ionization in heterogeneous plasma (HP), the mechanism of braking radiation generation in the bulk of heterogeneous plasma formations has been studied. A new model was proposed for the description of the effective interaction between microfields and charges in plasma. The stochastic motion of charged particles in HP is considered as an evolution of anharmonic oscillations executed by separate charges in an instant field of electric forces in the electroneutral cell. The effective values of frequency and the specific integral power of the braking radiation from HP in the radio-frequency spectral range are calculated by averaging over the ensemble of cells. The amplitude-frequency function and the relative contributions of separate oscillation modes of plasma charges to the emitted radiation intensity are determined in the framework of the random phase approximation. A comparative analysis of the data obtained in the model theory and the experimental ones obtained for plasma with aluminum oxide nanoparticles was carried out in the space of key HP parameters. A good agreement was obtained between the results of computer-assisted simulation and the experimental data both at the qualitative and quantitative levels. Possibilities to apply the results obtained for making telediagnostics of heterogeneous plasma formations were discussed.