

Evolution of carbonaceous particles from AGB stars to planetary nebulae: observations and theory

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The review of studies devoted to the evolution of carbonaceous grains at stages from the shells of asymptotic giant branch stars to planetary nebulae will be presented. This topic will be covered from several sides: observational data are summarized; the conditions for the formation of dust in the shells of stars and the conditions under which dust evolves further in protoplanetary and planetary nebulae are described; the results of experiments on creating analogues of interstellar dust and an analysis of their characteristics are presented; the mechanisms of formation of aromatic molecules and their clustering are considered; and finally, possible evolutionary scenarios for carbon particles are presented. Particular attention is paid to fullerene molecules, since they play an important role in constructing a whole picture of evolution. Their presence and heterogeneous distribution indicate that, depending on conditions, dust formation can proceed along two branches: through planar and non-planar aromatic molecules.

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