Observable signatures of lifecycle of PAHs in HII complexes

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We present results of optical spectroscopy and infrared and ultraviolet aperture photometry of HII complexes in galaxies IC 1727, NGC 7741, Holmberg II, and IC 2574. Spectra obtained with the 6-m telescope of SAO RAS are used along with archival data from Spitzer, GALEX and Gemini telescopes to estimate an age, hardness of the UV radiation field, and metallicity of studied HII complexes. These properties are compared to the F8/F24 ratio used as a proxy for the PAH abundance in order to reveal factors that may influence the PAH evolution in HII complexes. We found a correlation between the F8/F24 ratio and hardness of the UV field for both used indicators as well as a correlation between the F8/F24 ratio and an age of an HII complex. The well-known correlation between the F8/F24 ratio and metallicity is also confirmed. Analysing various mechanisms of PAH formation and destruction in the context of found correlations, we conclude that PAH abundance is indeed altered by the UV radiation within HII complexes, but this is not necessarily because of their destruction. PAHs can also form in HII complexes through UV sputtering of VSGs so that their net destruction rate is smaller than that of larger grains. Diversity of dust formation and destruction processes causes complexity in connections between PAH emission and ISM metallicity. Detailed modelling of all the processes is needed to elucidate the nature of the apparent deficit of PAHs in metal-poor environments.