NIR LASER RADIATION INDUCED CONFORMATIONAL CHANGES AND TUNNELING LIFETIMES OF HIGH-ENERGY CONFORMERS OF AMINO ACIDS IN LOW-TEMPERATURE MATRICES

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We review our recent results on combined matrix isolation FT-IR and NIR laser irradiation studies on glycine[a b], alanine[c], and cysteine[d]. The OH and the NH stretching overtones of the low-energy conformers of these amino acids deposited in Ar, Kr, Xe, and N_2 matrices were irradiated. At the expense of the irradiated conformer, other conformers were enriched and new, high-energy, formerly unobserved conformers were formed in the matrices. This enabled the separation and unambiguous assignment of the vibrational transitions of the different conformers. The main conversion paths and their efficiencies are described qualitatively showing that there are significant differences in different matrices. It was shown that the high-energy conformer decays in the matrix by H-atom tunneling. The lifetimes of the high-energy conformers in different matrices were measured. Based on our results we conclude that some theoretically predicted low-energy conformers of amino acids are likely even absent in low-energy matrices due to fast H-atom tunneling.

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