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Dynamics of Hydrated tRNA on Nanodiamond Surface Studied by Quasi-elastic Neutron Scattering GURPREET DHINDSA, Wayne State University, Detroit, MI, VADYM N. MOCHALIN, Drexel University, HUGH O' NEILL, Oakridge National Laboratory, YURY GOGOTSI, Drexel University, XIANG QIANG CHU, Wayne State University, Detroit, MI — Diamond is an outstanding material in many aspects, and nanodiamond (ND) inherits most of the superior properties of bulk diamond and delivers them at the nanoscale. ND has excellent properties that can be applied in biomedical field such as a good platform for drug delivery. In this study, we show that hydrated tRNA can be adsorbed on the surfaces of nanodiamonds and further demonstrate specific properties in its dynamics. We investigate the dynamics of the system by Quasielastic neutron scattering (QENS) technique. The dynamics of hydrated tRNA on ND surfaces exhibits a logarithmic-like decay within the time range of 10 ps to 1 ns, which has also been observed in the freestanding proteins and other biopolymers. We further compare the dynamics of tRNA hydrated with D_2O on ND surface with that of freestanding hydrated tRNA molecules. Our results show that the relaxational dynamics of tRNA on ND surface is much faster than that of the freestanding tRNA molecules. This gives the hint that the folded states of tRNA is modified by ND surfaces to engage faster dynamics. The difference in the dynamics of the hydration water modified by ND is another possible reason which causes the faster dynamics in tRNA on ND surface.

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