Title
Exploring the Chromatin Architecture in Living Cells by Minutes-Long Tracking of Gold Nanoparticles

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or blink upon continuous illumination, are extremely stable, very bright and their luminescence spans over the visible spectrum. These characteristics allow us to track them for minutes thus providing 3D trajectories appreciably longer than those based on fluorescent proteins or quantum dots. For this study we have analyzed the motion of 60 NPs. Each one provided us with a ~5 - 30 minutes long trajectory. In ~30% of the cases, we have observed that the NPs remain in regions of apparent confined motion (clusters) and eventually they undergo a long (in the micrometer range) excursion. We have found that the NPs always move faster within the clusters but slower while travelling between two clusters. These results suggest that the NPs get trapped into cavities where they can move relatively fast and eventually get transported (as seen by MSD analysis) from one cavity to the next one along segments of slower diffusion. Additionally, in all the cases analyzed, the NPs showed an increased intensity while moving between two cavities.

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Exploring the Chromatin Architecture in Living Cells by Minutes-Long Tracking of Gold Nanoparticles

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Investigating the chromatin compaction on the micro(nano)-meter scale, has become a question of interest to understand many cellular processes. Previous evidence suggests that the cell nucleus is spatially heterogeneous and with inaccessible regions mainly due to a high concentration of chromatin. However, the in vivo 3D picture of the nuclear structure remains unclear. In this work, we studied chromatin organization applying the orbital 3D tracking technique to 20 nm gold nanoparticles (NPs) previously incorporated inside the nucleus of NIH3T3 live cells. We have recently shown that metallic NPs do not bleach