Benefits of using detonation nanodiamonds (DNDs) as probes in imaging and spectroscopic studies with living cells have been proposed by several authors. Biocompatibility, nanometer sizes and a wide range of possibilities for surface functionalization, are some of the properties of DNDs that propitiate their use in biomedicine. In this work, detonation nanodiamonds were modified and functionalized following a procedure that resulted safe for DNDs interaction with cells. Carboxylation and hydroxylation reactions were accomplished in order to increase DNDs-cells affinity and enable later nanodiamonds functionalization with silanes and fluorescein. Raman micro-spectroscopy studies of Red Blood Cells (RBC) incubated with carboxylated DNDs showed no alterations on Raman spectra of hemoglobin, and hemolysis and viability tests were able to prove the expected biocompatibility. The use of fluorescein isothiocyanate attached to DNDs surface in studies with RBC and HeLa cells, allowed to observe nanodiamonds-cells interaction at the microscope, becoming a promising tool for fluorescence experiments \textit{in vitro}.

\textbf{Keywords:} detonation nanodiamonds, fluorescence, Raman

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