

# NANODIAMONDS AS A PLATFORM FOR BIOMEDICAL APPLICATION

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Recent developments in nanoscience dramatically transform our classical understanding of chemistry, biology, physics, and molecular interactions, show us new approaches to design delivery systems and bioactive compounds for nanomedicine.

For the last years, various carbon nanostructures were studied in nanomedicine for biomedical applications. They were tested as a potential treatment, as well as a carrier for bioactive molecules. In our studies, we focus on nanodiamonds (NDs). A powder made of ca. 5nm diamond particles with large accessible surface and tailorable surface chemistry delivers extraordinary optical, mechanical, electronic, and thermal properties on the nanoscale. Inert and biocompatible NDs could be applied in nanomedicine and biotechnology to improve the therapeutic value of various drugs. The coating of drugs on NDs could increase their bioavailability, solubility, retention time, efficacy, tolerability, and drug therapeutic index.

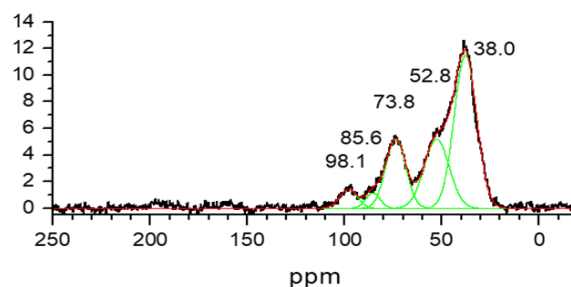


Fig.1 The <sup>13</sup>C MAS NMR spectrum of the starting NDs

In the current research, we focused on designing the most beneficial method of the preparation of drug-coated biocompatible NDs, as the drug delivery system for medical applications. The pre-treated detonated NDs bear carboxylic groups on their surface. This allows us to perform coating using traditional methods of organic synthesis. Selected bioactive compounds were synthesized and purified, followed by attaching/coating on NDs' surface. The biodegradability of the surface linkers and functional fragments was studied by the CBT method. The modified NDs and their formulations were characterized by different techniques (ssNMR, FTIR, DLS, SEM) and tested in the collaborator's biomedical laboratories.

## References

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