

Nanocrystalline diamond sheet in a Fabry-Perot interferometric sensor

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Fiber-optic interferometric sensors are commonly used in many fields of science and industry to measure values of physical quantities, e.g. distance. The proper protection of the optical fiber end-faces can further extend possibilities of their use due to better resistance to mechanical and chemical damage, and prolonged lifespan. Hence the need for new materials sufficient as coatings for fiber-optic end-faces. In this work the application of a new material – nanocrystalline diamond sheet (NDS) – as a coating of optical fiber is presented [1]. In recent years, diamond has been of interest to scientists due to its extraordinary properties such as biocompatibility, excellent chemical stability, great hardness, high thermal conductivity and optical transparency in a wide wavelength range.

The NDS sample was produced in the Microwave Plasma Assisted Chemical Vapor Deposition System [2]. A sample deposition process, its characterization and the sensor's response are presented in this work. The measurement setup is built as a Fabry-Perot interferometer using broadband light source working at central wavelength of 1550 nm, optical spectrum analyzer, optical coupler and optical-fibers.

- [1] M. Kosowska, D. Majchrowicz, M. Ficek, P. Wierzbą, Y. Flegler, D. Fixler, and M. Szczerska, "Nanocrystalline diamond sheets as protective coatings for fiber-optic measurement head," *Carbon* **156**, 104–109 (2020).
- [2] R. Bogdanowicz, M. Ficek, M. Sobaszek, A. Nosek, Ł. Gołuński, J. Karczewski, A. Jaramillo-Botero, W. A. Goddard, M. Bockrath, et al., "Growth and Isolation of Large Area Boron-Doped Nanocrystalline Diamond Sheets: A Route toward Diamond-on-Graphene Heterojunction," *Advanced Functional Materials* **29**, 1805242 (2019).