Selected Application Examples in Functional Materials

by Coated Hollow Capillaries used as X-Ray Optics

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For different applications in Functional Materials hollow glass capillaries are widely used as X-Ray Optics. State of the art is to use these capillaries uncoated[1], so that their potential is limited in certain applications of Functional Materials.

In this talk, different selected coating technologies like Chemical Vapour Deposition (CVD) in order to coat even complex hollow glass capillaries[2] used as X-Ray Optics are introduced. These different coating methods are discussed intensively for the modification and functionalisation of different hollow glass capillaries with High-Z-metals[3] in order to use them as X-Ray Waveguides e.g. for analytical applications like X-Ray Optics for microanalysis. As High-Z-metals mainly d-block transition metals can be used. For this purpose, special organometallic, elementorganic or coordination compounds[4] mainly of d-block transition metals are decomposed chemically in these capillaries. Thus, a specific tailored nanostructured surface for the respective applications in Functional Materials can be realized to guide even hard X-Rays in these hollow capillaries like optical waveguides. To achieve this objective, the right choice precursor material is highly relevant.

These innovative surface coatings, which alter the properties according to the state-of-the-art of uncoated X-Ray Optics significantly, can enable these capillaries to boost up their performance for different applications in analytics like in Functional Materials. The ultimate application of these microstructured capillaries modified and functionalised by e.g. High-Z metals is their use as X-Ray Optics for different analytical applications.

These applications with selected examples will also be presented and discussed intensively in this talk.

[4] J. Wochnowski et al., Surface-modified structures, useful e.g. in optical or catalytic applications, comprise substrate, e.g. of glass, silicate primary coating and secondary coating, e.g. of metal Patents: DE 102007049930 (A1) 2009-04-23; DE200710049930 20071018; DE 102007049930 (B4) 2011-04-28.