

Assessment of doctoral thesis

"Deposition of colloidal particles onto solid substrates: impinging-jet method"

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The doctoral thesis is aimed at synthesis, chemical and optical properties of bismuth vanadate pigment, and its deposition on plasma treated and untreated polycarbonate (PC), polyethylene (PE), and polypropylene (PP) substrates. Optical properties of contact lenses were studied as well. Great effort was devoted to synthesis of nano-sized crystallites of BiVO_4 with controlled morphology and deposition of coatings using the crystallites. Contact angle measurements were employed in order to characterize wettability of PC, PE, and PP planar substrates. The substrates were surface modified by low-temperature plasma to increase their wettability and improve deposition of colloidal particles (polystyrene, BiVO_4).

The thesis was well organized, of good graphic design, without significant formal mistakes, and 61 references were used. Correct techniques and methods were applied to prepare samples and analyze them.

Questions and comments are as follows:

p.36, last line: Does the equation mean dissociation of the component R?

p.36, line 5, How can you obtain the oxygen molecule (O_2)?

p.45, line 10: The point (not comma) is used as the decimal point in English (0.05°).

p.51: The Owens-Wendt-Kaelble theory should be mentioned as the geometric mean method belongs among standard techniques.

p.53: The plasma reactor is not specified in chapter 2 or 3. What were the chamber geometry, gas used, and treatment conditions?

p.55, chapter 2.2.3: Did you deposit a film or layer of particles?

p.58, line 14: You should use the letter "mu", if the diameter is given in microns.

p.73, Table 2: Why only polar testing liquids were used to measure contact angles? Often diiodomethane is recommended as "non-polar liquid" for characterization of wettability.

p.75, Table and p.76, Table 6: It is known that the surface free energy may decrease after plasma treatments due to the aging effect. Did you observe any change of contact angles as a function of time?

p.77, Fig. 37 and next: What was the observed area?

ps.76-80: Do you have any idea how to improve deposition of colloidal particles?

The doctoral thesis fulfils the criteria for such a work and thus I recommend it for the defense proceedings. In case of successful defense, I recommend to award the PhD degree.

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