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Interactive comment on "Immobilized photocatalyst structure assuring optimal light distribution in a solar reactor" *by* A. S. El-Kalliny et al.

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Thanks a lot for your valuable comments. The following is the modifications and answers:

Comment: In the title, "optimal" should be replaced by "efficient" or "better".

Answer: The word "optimal" is replaced now by the word "efficient" in the title.

Comment: The authors don't prove in their paper that there cannot be any better system. It is not even compared with a plain plate supporting the same amount of TiO2, coated by the same technique.

Answer: The main purpose of this paper was to determine the best light distribution with the highest surface area of the immobilized catalyst. Through this optimization process, we can determine the design parameter for a fixed bed reactor. But as for the comparison between the meshes and the flat plate the following sentence has been added at the end of Section 3.1.2. : “On the other hand, a comparison between the mesh structure and the flat plate in the fixed-bed reactor on the photodegradation of HA is given in detail in another unpublished work (El-Kalliny et al., to be published)”.

Comment: The statement "This indicates that the O510-P25 and O500-P25 are the best sol gels for coating the woven meshes." is an overstatement as only these two have been tested.

Answer: The sentence “This indicates that the O510-P25 and O500-P25 are the best sol gels for coating the woven meshes” was removed as the previous sentences explained enough that the modified sol gel with P25 is better than the plain sols.

Comment: EPD: is there a difference in coating according to the side which faces, or not, the opposite electrode?

Answer: Of course there was a difference between coatings of the two faces. The side which faces the cathode was coated more efficiently than the other side. The best coated face was placed in front of the light source during the photodegradation process.

Comment: How much TiO2 (g/m2) effectively coated in each case?

Answer: It is very difficult to calculate the amount of TiO2 attached on the mesh substrates, due to the binding components that are present in the commercial sol gel. Thus, the most important factors for the comparison between the coated meshes are the film thickness and the percentage of light distribution.

Comment: the section 4.3.2 could have been shorter, as some illustrations/statements are rather obvious : the system obeys stricktly well known Beer-

DWESD
7, C12–C14, 2014

Lambert's law and the standard grid shadowing effect. e.g. : - fig 4.9, 4.10, 4.11. -"as the HA concentration decreased the percentage of the transmitted light through the HA layers increaded" - fig 4.12 is just the plain application of Beer-Lambert's law that, as the absorbance of the water increases (by thickness or AH conc.),the penetration depth of light decreases, thus reducing the contribution of the deapest meshes.

Answer: I agree with you that the system obeys Beer-Lambert's law and the standard grid shadowing effect, but I have to investigate that especially when we combine the two effects in order to reach the conclusion that these model equations (1) and (2) can be used to describe the transmission light profile inside the packed bed reactor. In addition, Figure 12 shows the introduction of the dimensionless parameter β to determine the number of mesh layers and the separation distances between them according to the concentration and the molar absorptivity of the HA.

Comment: only few writing error (e.g. 2.2.2 Sol gel dip coating method"e")

Answer: The word "method" has been corrected and the whole text has been carefully revised.

Please also note the supplement to this comment:
http://www.drink-water-eng-sci-discuss.net/7/C12/2014/dwesd-7-C12-2014-supplement.pdf

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Interactive comment on Drink. Water Eng. Sci. Discuss., 7, 59, 2014.