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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:

(1) Comment: Drawbacks of the study are that 1) only very basic water matrices were tested (pure and HA spiked water), 2) no comparison was made with conventional TiO2 processes (suspended TiO2, conventional immobilization) and 3) limited research was conducted with respect to optimal grid configuration. Hence, it is difficult to prove the benefits of the novel configuration presented.

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 conventional immobilization such as immobilization on 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mesh structure and the flat plate in the fixed-bed reactor on the photodegradation of HA is given in detail in another unpublished work (El-Kalliny et al., to be published)”.

(2) Comment: The title should be somewhat more specific. "Immobilized photocatalyst structure" sounds not very novel, while a specific and novel structure was used.

Answer: The title was changed to be: “Immobilized photocatalyst on stainless steel woven meshes assuring efficient light distribution in a solar reactor”

(3) Comment: It was not clear to the reviewer why the authors did not conduct tests using "real" drinking water eventually containing organic micropollutants. This would have increased the potential impact of the paper.

Answer: This paper is just for determination of the essential design parameters for a fixed bed reactor. Then the reactor efficiency for removal of HA and micropollutants will be published as I referred in the answer of the first comment.

4) Comment: The figures mainly present very basic results that were not really surprizing. E.g. the perfect model fit shown in Figure 9 could be expected as the Lambert-Beer law applies. Some figures (incl. Fig. 9) hence might be discarded.

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 effects of both humic acids and meshes 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

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distances between them according to the concentration and the molar absorptivity of the HA.

(5) Comment: Did the authors consider adsorption of HA's onto the TiO2? Could this have affected some of the outcomes? The concentration of HA's used was not justified. What is the unit of this concentration (mg carbon/L) and which HWhy does Figure 11 not contain measurements for a HA concentration of 3 mg/L?

Answer: There is adsorption of HA onto TiO2 as you mentioned, but all the measurements of the transmitted light through the HA layers and the mesh layers were done in steady state conditions, and thus it did not affect the transmission measurements. For the HA concentration, the unit is mg/L and not mg carbon/L. The conditions for the preparation of HA sodium salt from Sigma Aldrich were fixed by dissolving HA in deionized water and filtering it through a 0.45 μm syringe-driven filter unit (Millex) to remove suspended solids (0.03 gL-1). For Fig. 11, the theoretical line of the 3 mg/L HA was drown just for declaring that the light transmission decreases by increasing the HA concentration between meshes and only the theoretical and measured values with 9.7 mg/L HA concentration was compared.

(6) Comment: The paper contained some (few) typo's: P67, line 23: "with increases the path length...", P68, line 1: "as high as practical capture", P70, line 22: "most possible small wire diameter"

Answer: All mentioned typo's have been corrected, but for the following sentence: "Nevertheless, choosing the most possible small wire diameter (0.355 mm) preserved the minimum cracks formation, as by further decreasing of the wire diameter the curvature increases and the possibility of cracks formation increases" I do not get the wrong in it. Please clarify.

Please also note the supplement to this comment:
http://www.drink-water-eng-sci-discuss.net/7/C44/2014/dwesd-7-C44-2014-

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supplement.pdf

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