**JSCS #7812**

**Reply to the Reviewer Comments**

**Comments:** The presented results for Pt-Cu/C show slightly better performance compared to Pt/C in the sense of the current maximum and poisoning resistance; thus some beneficial effect of Cu is observed. However, the reference catalyst for MOR is Pt-Ru and the activity of new catalysts needs to be compared to this material.

**Author Reply:** Thank you very much for such a critical review. Obviously, up-till now, Pt-Ru is reported as an efficient electrocatalyst for MOR. We have compared our results (on Pt-Cu/C) with previously reported results on Pt-Ru/C (see Table 1). Beside this we know Methanol oxidation mainly occur on platinum which is a precious metal (Ru is also precious metal) hence the common trend is to minimize the platinum content by alloying it with non-precious metal (i.e alloying Pt with Cu), therefore for comparison we use commercial ETEK Platinum/C electrode. Moreover, commercial ETEK Platinum/C can also be utilized as standard reference (for comparison purpose) for MOR (see reference: CrystEngComm, 2014, 16, 2411–2416, and Chem. Sci., 2016, 7, 5414–5420).

**Reviewer Comments:** In the Introduction or later in Discussion, no one article reporting Pt-Cu catalysts for MOR is cited (although there are plenty of them) and the results are not compared to the relevant literature data. The articles in which Pt is combined with other metals are quoted, so a reader could be misled that Pt-Cu has not been tested for MOR before.

**Author Reply:** Thank you very much for suggestion Now, article on Pt-Cu are reported in revised manuscript

**Reviewer Comments:** Beside this, there are numerous omission and wrong interpretations of the results, as seen in the attached document. The manuscript should be thoroughly revised before reconsidering for publication in JSCS.

**Reply:** Thank you very much for such a nice critical review. All corrections/suggestions have been incorporated in revised manuscript (with yellow color). Moreover, as TEM results are enough for characterization therefore SEM images are also omitted in the revised manuscript.

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| **Reviewer comments** | **Author Reply to the comments** |
| lines12-13 Why TEM is not mentioned? | TEM has been mentioned |
| line 17 Pt4Cu instead of Pt4:Cu1 | Corrected |
| lines 18 / 21/ 22 2 instead of 1.98 / 89 instead of 88.69 / 65 instead of 64.65 | **-do-** |
| line 26 Pt-Cu …. | **-do-** |
| lines 48-50Methanol and ethanol are not hydrocarbons but alcohols. HCOH is formaldehyde and as far as I know, it is not considered as a fuel; you might think of HCOOH, i.e. formic acid. Thus, the text should be corrected as: … (H2) or small organic molecules (CH3OH, C2H5OH, HCOOH etc.). Methanol as a fuel has immense potential among other small organic molecules due to … | **-do-** |
| line 57 The anode catalyst in DMFC is Pt-Ru, but not pure Pt. Other Pt-based bimetal catalysts are investigated in order to find a material more active for MOR than Pt-Ru. | **-do-** |
| line 62 Any reference for Pd and Ir? | References have been cited accordingly |
| line 90 What is a role of tetra-n-butyl ammonium iodide and PVP in the reaction mixture? | role of tetra butyl ammonium iodide and PVP have been mentioned and also discussed later in the result and discussions |
| line 112 10 μL? | Correction made |
| line 133 Pt4Cu instead of Pt4:Cu1 | Corrected |
| line 134 What is 3.2.1.2.?There are no experimental details of the EDX, XRD, SEM and TEM measurements. | We are sorry that was some misshape and has been compensated |
| Fig. 2, line 147 Instead of PtCu, Pt-Cu/C should be on the diagramIn the entire text Pt-Cu should be replaced with Pt-Cu/C, because is is supported catalyst, just like Pt/C | Corrected |
| line 154 Please comment the Pt-Cu peaks shift with respect to Pt peaks considering atomic radii of these metals | Pt-Cu peaks shift has been explained in terms of atomic radii. |
| line 161 How do you know from TEM images that Pt-Cu particles are formed? | We meant the particle formation was confirmed, not the alloy formation |
| line 162 There is no particle size distribution diagram in Fig. 4. Without this diagram you can only say that particle size is around 20-30 nm. | The said correction has been made accordingly. |
| line 183 … in case of hydrogen adsorption … | Corrected. |
| Fig. 5 Y-axis title should be *I* / mA (to be equivalent of X-axis title)  | Corrected |
| lines 214-221 The calculation of ECSA given by the equations (2) – (5) should be omitted, and only the final result should be quoted.  | Equations and calculations have been omitted, and only final results were mentioned. |
| lines 234-236 “The comparison …also shown in Fig. 6a.” This sentence is needless, because the same was said in the previous sentences. | The said repetition has been omitted. |
| line 238 Pt-Cu/C instead of as prepared | Corrected. |
| lines 240-242 Better electrocatalytic activity of Pt-Cu/C compared to Pt/C is reflected in higher peak current density. The difference in the onset potential is barely observed, as you said in line 232. | **-do-** |
| line 245 carbon monoxide | **-do-** |
| lines 243-244 Why are you considering ligand effect only and neglect the strain effect? Can you relate your conclusion to the DFT calculation of d-band center for Pt-Cu alloy? | Of course, we can not neglect the strain effect, and we have mentioned it accordingly. Yes DFT calculations can be possible but we do not have the said expertise at hand to relate our results using DFT.  |
| lines 249-251 The peak in the reverse scan in due to methanol oxidation on the surface freed of intermediate species on the high positive potentials. | The said correction has been made. |
| lines 264-268 Decline in the current is solely due to accumulation of poisoning species. There is no decrease in methanol concentration gradient near catalyst surface, because MOR is slow reaction and your electrolyte contains high methanol concentration, so the diffusion can replenish the entire amount of methanol consumed in so slow reaction.  | The correction has been made.  |
| Fig. 6 Y-axis titles on 6a) and 6b) should be *j* / mA cm­−2 X-axis on 6b) should be *t* / min | Corrected |
| lines 279-280, Fig. 7 Specific activity and current density calculated with respect to ECSA are the same. The units for current density in your Fig. 6 and the specific activity in Table 1 and Fig. 7 are the same, i.e. mA cm−2, and the peak current density values are also the same. From the text a reader could think that specific activity is some new parameter. | Corrected similar term, current density was used in all places |
| line 300 TEM? | TEM added. |