



SDI Review Form 1.6

Journal Name:	Physical Review & Research International
Manuscript Number:	2013_PRRI_5663
Title of the Manuscript:	Improvement in Gasochromic Properties of Tungsten Trioxide by Optimized Pd Doping
Type of the Article	Research Paper

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound.

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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments	<p>As I see your priority and research directions were towards higher efficiency of WO₃ thin film with Pd as the catalyst in the gasochromic properties. My opinion is that your study of surface morphology and structure of thin film is well done. Results of investigations and some external influence on the transmission modulation $\Delta T\%$ (Figures 7-10; Tables 1 and 2) are also correct, but some discussion of your results in relation to previous papers by other authors is not exemplary.</p> <p>My suggestion is : paragraphs IV, V and VI (page 2) from "Introduction" move to "Results and Discussion", after your results and fill in. "Introduction" is not a good place for the new results. Emphasize the contribution of obtained results to the improvement in gasochromic properties of composite.</p>	<p>Your suggestion about displacement of paragraphs was proper and logical and it is done.</p> <p>To emphasize the contribution of obtained results to the improvement in gasochromic properties of composite we can say:</p> <p>The properties of WO₃ thin film were influenced by the annealing temperature and catalyst concentration. Samples were tested under different annealing temperatures and catalyst solutions. The results showed that the optimum Pd/WO₃ sample was obtained at an annealing temperature of 300°C and the catalyst concentration of 0.05M. The Pd/WO₃ response time (T₉₀) for the 2.4% H₂ was 3s and the recovery time was 25 s, which is a significant reduction from the results (60 s) of Lin et al. [9]. A comparison of the present study with Lin et al. [9] indicates that the size of the grains decreased and the surface-to-volume ratio increased, which improved the efficiency of the gasochromic property. In addition, the transmission modulation change ($\Delta T_1\%$) increased 12% and the concentration of H₂ decreased about 2%.</p>
Minor REVISION comments	<p>Before abbreviations are used for the first time in the text add the acronyms: X-ray diffraction (XRD)... It is necessary to explain $\Delta T\%$: The transmission modulation change ($\Delta T\% = T_b - T_c$) where T_b is bleaching and T_c</p>	<p>All abbreviations are used for the first time in the text, have been checked and "pulsed laser deposition" was added for (PLD).</p> <p>$\Delta T\%$ was explained in the text as: $\Delta T_1\% = T_a - T_b$,</p>



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	<p>colouring transmission fill in...</p> <p>Write all experimental techniques in lower case: the scanning electron microscopy...</p> <p>Orthography errors:</p> <p>-Page 2. Kudo's procedure [16] - upper case Kudo's method</p> <p>-Page 7. Fig. 7: transmission → Transmission</p> <p>-Page 7. Table 1: transmission → Transmission...</p> <p>-Page 8. Fig. 8. Final annealing temperature (°C)</p> <p>-Page 8. Graph of...</p> <p>-Page 9. Fig. 10. Graph of transmittance ...;</p> <p>Use in the text transmission or transmittance.</p> <p>-Page 9. Table 2.1 ...WO₃</p> <p>Pay attention to the space between the words, number and words, etc.</p>	<p>where T_a is initial transmission and T_b is coloring state of glass. Also $\Delta T_2\% = T_c - T_b$, explained as T_c is bleaching and T_b is coloring state of the glass.</p> <p>Besides, we used lower case for all experimental techniques.</p> <p>Orthography errors have been checked and edited and also All the words "transmittance" changed to "transmission" in the text and figures legend.</p>
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<p><u>Optional/General</u> comments</p>	<p>Improve the discussion of obtain results. Which influence is dominant on gasochromic performance of the composite: The characteristics of support, catalyst, gas... Can you discus the correlation between the structure of composite and gasochromic properties? Underline your general contribution in solving this problem?</p>	<p>Obtained results have been improved. For example we added comments to SEM figures to show what the figures imply. The XRD figures combined into one diagram to more directly reflect the evolution of crystallization with the annealing temperature. Some new results such as the long time stability of coloration in Pd/WO₃ thin films were added too. About dominant parameters on gasochromic performance, since the differences between $\Delta T_1\%$ at different concentrations of catalyst are greater than the ones at different annealing temperatures, we can know that catalyst concentration is dominant parameter on gasochromic performance of the composite. The correlation between the structure of composite and gasochromic properties, is explained in introduction section as mechanism of gasochromic coloration by H₂ with columnar structure. According to Faughman theory, the coloration of WO₃ thin films occurs because of the valence change in tungsten (W⁺⁶-W⁺⁵) that causes ray absorbance and the diffusion of electrons and positive ions into the WO₃ lattice that completes the coloration process. Besides, The sol-gel method used in this study makes the WO₃ film more porous than those obtained in other methods. Its porous structure increased the surface area and the dissociation sites. Also the size of the grains decreased by sol-gel and Kudo method and the surface-to-volume ratio increased, which improved the efficiency of the gasochromic sensor. By direct adding of the PdCl₂ solution on the surface of the WO₃-coated glass and its chemical</p>
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		<p>reduction by annealing, we increased the possibility of collisions between H₂ atoms and Pd particles and thus, the gasochromic efficiency improved.</p> <p>We tested 3 concentrations of catalyst and 4 different annealing temperatures and regard to the obtained experimental results; we chose optimum condition to improve the transmission variation and response and recovery times. These comparisons are mentioned at the end of the results and discussion by details.</p>
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