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Abstract

We have synthesized new colorimetric hydrogen-sensing materials, PdO/metal oxide hybrid nanoparticles, in which palladium oxide was loaded upon surface of substrate materials via an acid-base reaction between a H_2PdCl_4 solution and substrate materials, ZnO, MgO, TiO_2, and SiO_2 respectively at 25°C. The colorimetric hydrogen gas sensing properties of all the samples, PdO/ZnO, PdO/MgO, PdO/TiO_2 and PdO/SiO_2, were characterized and compared in order to investigate how hydrogen gas sensitivity would be affected by surface property of substrate materials. It was confirmed that the amount of the loaded PdO, which was thought to be closely related with the colorimetric hydrogen sensitivity, was quite different according to the substrate materials and was increased with increasing of the basicity of substrate materials (ZnO > MgO > TiO_2 > SiO_2). Consequently, among the PdO/metal oxide hybrid nanoparticles, the largest amount of PdO was observed to be loaded on ZnO substrate nanoparticles due to its highest basicity. The best colorimetric hydrogen gas sensing properties (color difference, $\Delta E = 71.57$) was observed in PdO/ZnO hybrid

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