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Data Article

Effect of layer thickness and annealing temperature on the electrocatalytic activity of CNT/Pt counter electrode for triiodide reduction

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ABSTRACT

The data presented in this article are related to the research article entitled "Balance between the charge transfer resistance and diffusion impedance in a CNT/Pt counter electrode for highly efficient liquid-junction photovoltaic devices" (Dao and Choi, 2018) [1]. This article presents the effect of annealing temperature and thickness of CNT/Pt film on the electrocatalytic activity of CNT/Pt counter electrode for triiodide reduction. For this purpose, we firstly fabricated CNT/Pt paste with different amount of CNT/Pt. The CNT/Pt film is then fabricated by doctor blade method.

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Specifications table

Subject area	*Physics, Chemistry*
More specific subject area	*Counter electrode of dye-sensitized solar cells*
Type of data	*Tables, Figures, Image, Text file*
How data was acquired	*Evaluating the electrochemical catalytic activity of electrodes: The redox behaviors of the electrodes under study were evaluated through a comparative analysis of their cyclic voltammograms (CVs) using three-electrode electrochemical cells. A Pt mesh and AgCl/Ag electrodes served as the CE and the reference electrode, respectively. A solution of 10 mmol LiI, 1 mmol I_2 and 100 mmol $LiClO_4$ was used as the electrolyte. The CVs were recorded in a range of 200 to − 500 mV at a scan rate of 100 mV s^{-1}. Electrochemical impedance spectroscopy (EIS) was carried out with symmetrical dummy cells fabricated from two identical electrodes with a frequency range of 100 kHz to 100 mHz and a perturbation amplitude of 10 mV. The obtained spectra were fitted using the Z-view software (2.8d, Scribner Associates, Inc.) with reference to the proposed equivalent circuit.*
Data format	*Raw, filtered, analyzed*
Experimental factors	*CNT/Pt content, thickness, temperature*
Experimental features	*A solution of 40 mg ethyl cellulose in 900 mg alpha-terpineol was prepared, after which 10, 50, 100 and 200 mg of CNT/Pt powders were added to the prepared solution. In order to obtain the CNT/Pt paste, the mixture was ground through a three-roll mill. To realize the CNT/Pt film-coated FTO glass, the doctor-blade method was applied and the film was dried at 300 °C for 30 min.*
Data source location	*Chungnam National University, Daejeon, South Korea*
Data accessibility	*The data are available with this article.*

Value of the data

- CNT/Pt paste with different amount of CNT/Pt is carefully described.
- The reduction rate of triiodide ions increases with an increase in the amount of CNT/Pt in the paste.
- The electrocatalytic activity increases with an increase in the thickness of CNT/Pt film.
- The annealing temperature does not affect to electrocatalytic activity.
- Adhesion test indicates the stability of the counter electrodes.

1. Data

The dataset of this article provides information on the effect of annealing temperature and thickness of CNT/Pt on the reduction of triiodide ions at counter electrode of dye-sensitize solar cells. Scheme 1 presents the fabrication process of preparing CNT/Pt paste and coating CNT/Pt on FTO glass substrate. Figs. 1–4 show electrochemical catalytic activity performances. Tables 1-5 present the adhesion test data, counter electrode properties extracted from the CVs and simulated data of the EIS spectra as calculated from the equivalent circuits.