Supporting information

$RuO_2.nH_2O$ Nanoparticles anchored on Carbon Nano-onions: an Efficient Electrode for Solid State Flexible Electrochemical Supercapacitor

Vedi Kuyil Azhagan Muniraj[a], Chaitanya Krishna Kamaja [abc], Manjusha V. Shelke*[abc]

a) Physical and Materials Chemistry Division, CSIR-National Chemical Laboratory, Pune-411008, MH, India. E-mail: mv.shelke@ncl.res.in; shelkemanju@gmail.com

b) CSIR-Network Institute for Solar Energy, CSIR-National Chemical Laboratory, Pune-411008, MH, India

c) Academy of Scientific and Innovative Research (AcSIR), Chennai, 600113, TN, India

Total number of pages: 5

Contents:

Figure S1. High resolution XPS spectra were taken for Ru 3d/ C1s and O1s. (a) shows two distinct binding energies at 281.1 and 284.5 eV corresponding to Ru $3d_{5/2}$ and Ru $3d_{3/2}$ respectively. Further it shows the C1s peak from carbon peaks overlapped with Ru 3d peaks (b) The O1s peak further contains distinctive peaks of Ru-O-Ru at binding energy of 529.1 eV, Ru-O-H at 530.56 eV and H_2O at 531 eV.

Figure S2. High resolution FESEM image of cross section of the flexible electrode. The yellow bar indicates the PDMS/AB film which holds the flexibility of the electrode and the red bar indicates the fibers of conducting carbon paper (after pressing).

Figure S3. (a, b) show HRTEM images of RuO_2 nanoparticles decorated on CNOs

Figure S4. Comparative charge-discharge curves of CNOs and RuO_2/CNOs at 1 Ag^{-1} current density in 0.5M H_2SO_4 electrolyte.

Calculation of Specific capacitance of RuO_2

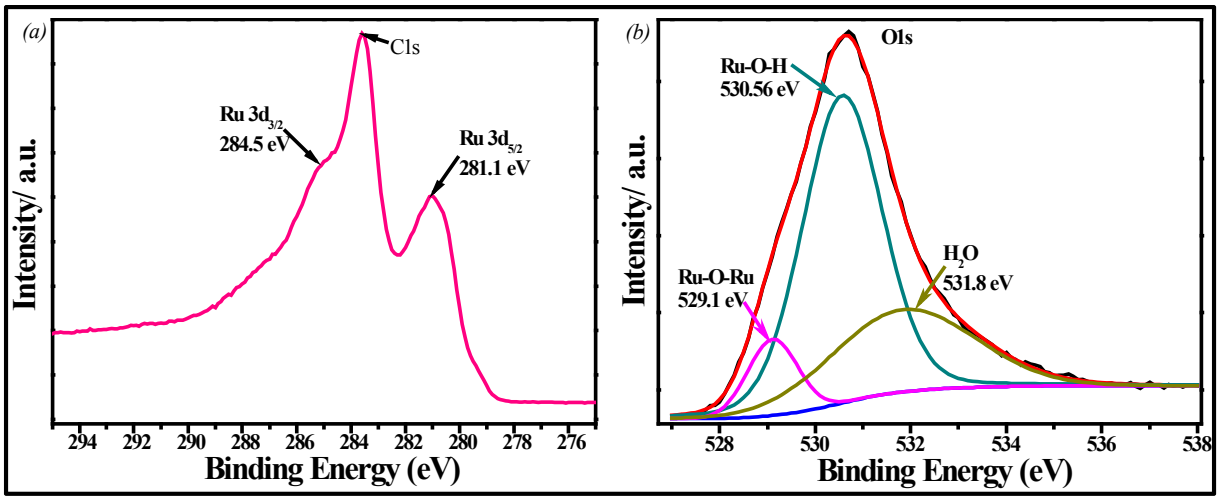

Figure S1. High resolution XPS spectra were taken for Ru 3d/ C1s and O1s. (a) shows two distinct binding energies at 281.1 and 284.5 eV corresponding to Ru $3d_{5/2}$ and Ru $3d_{3/2}$ respectively. Further it shows the C1s peak from carbon peaks overlapped with Ru 3d peaks (b) The O1s peak further contains distinctive peaks of Ru-O-Ru at binding energy of 529.1 eV, Ru-O-H at 530.56 eV and H_2O at 531 eV

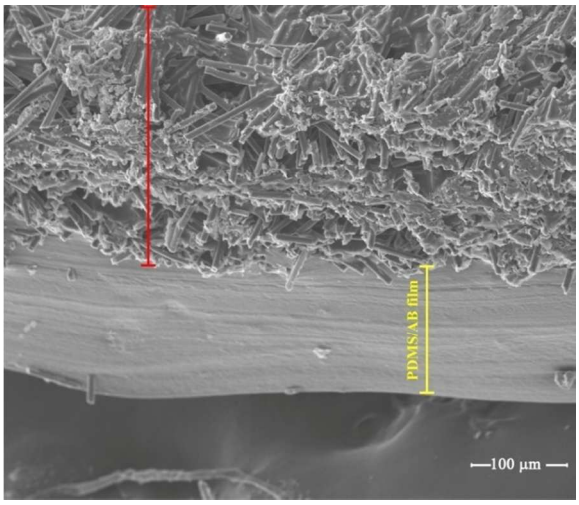

Figure S2. shows High resolution FESEM image of cross section of the flexible electrode. The yellow bar indicates the PDMS/AB film which holds the flexibility of the electrode and the red bar indicates the fibers of conducting carbon paper (after pressing).

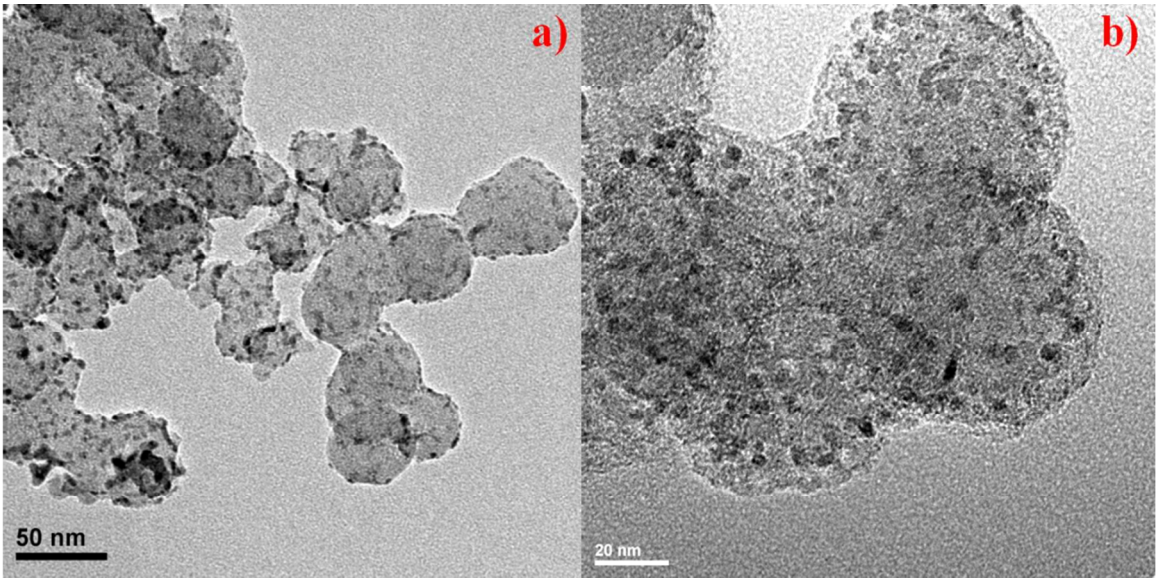

Figure S3. (a, b) show HRTEM images of RuO_2 nanoparticles decorated on CNOs

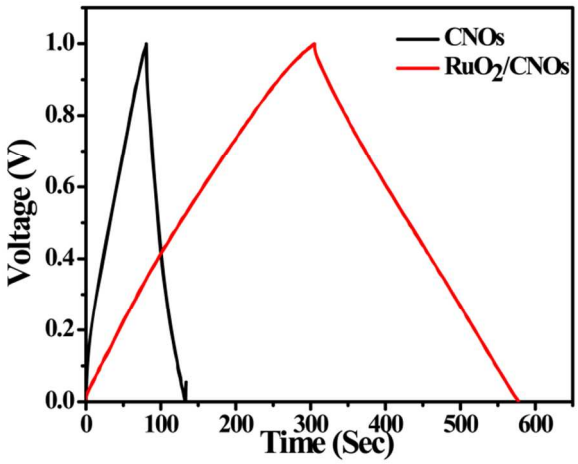

Figure S4. comparative charge-discharge curves of CNOs and RuO_2/CNOs at 1 Ag^{-1} current density in 0.5M H_2SO_4 electrolyte.

Calculation of Specific capacitance of RuO_2:

The specific capacitance of CNOs at 1A/g is calculated as 112 F/g and for RuO_2/CNOs it is 570 F/g.

Hence the contribution of only RuO_2 was obtained from the formula,

$\mathbf{C}_{RuO2} = [\mathbf{C}_{cd}\text{-}\mathbf{C}_{CNOs}$ X (1-45.85%)]/45.85%

$\mathbf{C}_{RuO2} = [\mathbf{C}_{cd}\text{-}\mathbf{C}_{CNOs}$ X (1-45.85%)]/45.85%

= [**570-112** X (1-45.85%)]/45.85%

= [**570-112** X 0.5415]/45.85%

= **509**/45.85%

$\mathbf{C}_{RuO2} =$ **1110 F/g**