Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

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ESI-1

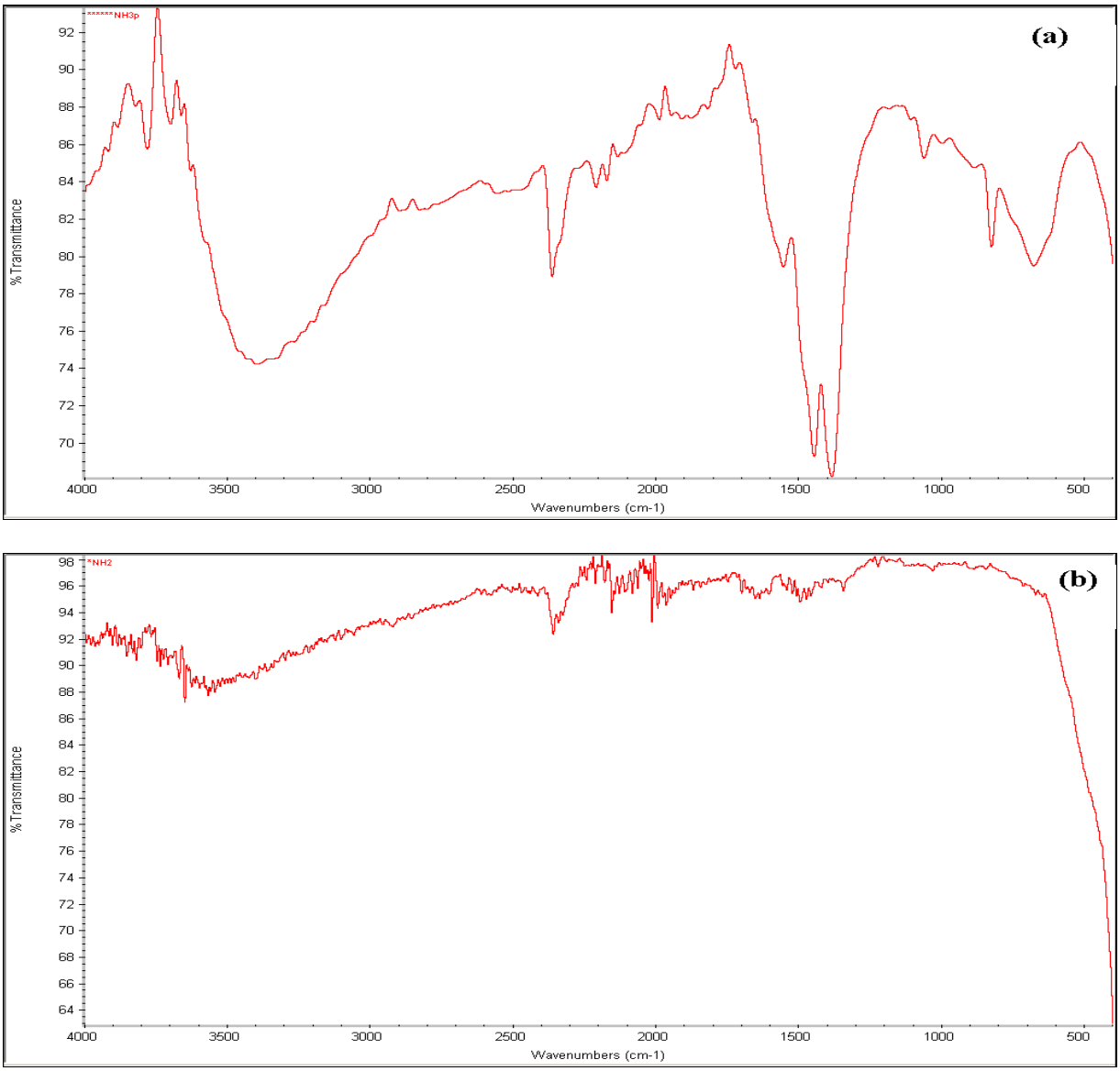

Fig. S1 FTIR spectra of precursor (a) before and (b) after calcination

FTIR was the primary tool employed to establish the formation of NiO particles. The spectra of the synthesized powder before and after calcinations were recorded. The spectrum of the precursor powder is illustrated in Fig. S1a. Several absorption peaks were observed in the precursor spectra. The broad peak at 3393 cm^{-1} is due to the moisture content in the samples.

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The peaks at ~1400 cm^{-1}, 825 cm^{-1} and 675 cm^{-1} were assigned to carbonate species in the precursor. The peak at 2632 cm^{-1} is the signature peak of CO_2. Thus from the IR data it can be predicted that the precursor sample is a hydrated nickel carbonate species.

Fig. S1b shows the FTIR spectrum of the sample after calcination. As seen from the spectra, only a prominent peak ~400 cm^{-1} is found. However due to instrumental shortcoming the peak is not entirely seen. This peak corresponds to Ni-O stretching vibration[*]. Also what is worth noting here is that peaks corresponding to the remaining functional groups disappear. Therefore we can justly say that on calcinations, the precursor got converted into NiO.

[*] D. N. Srivastava, V. G. Pol, O. Palchik, L. Zhang, J. C. Yu and A. Gedanken, *Ultrason. Sonochem.*, 2005, **12**, 205-212.

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ESI-2

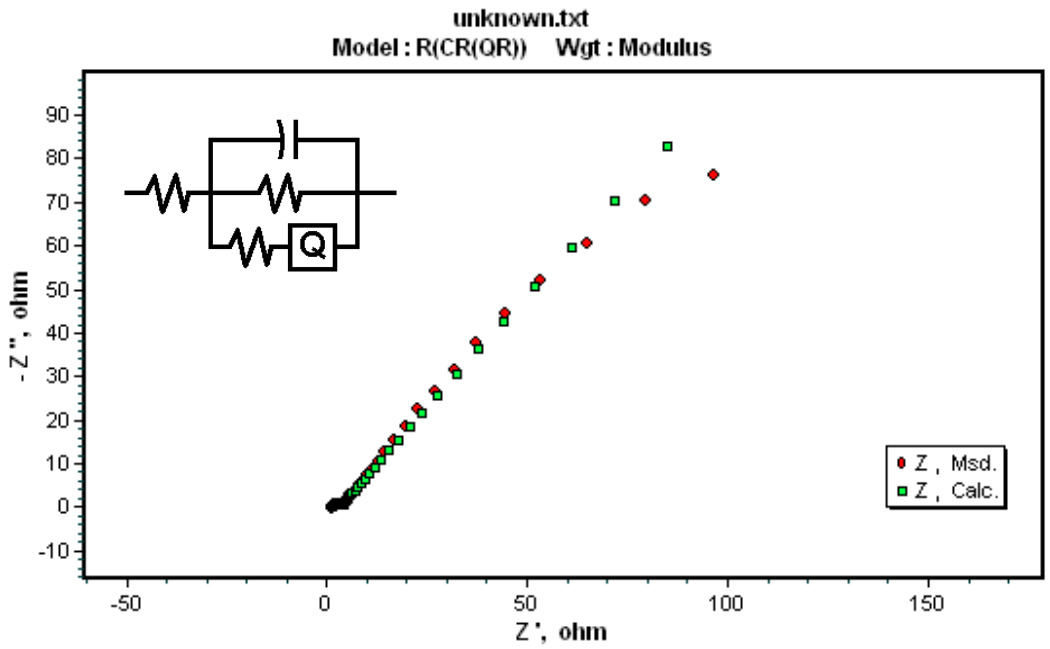

Fig. S2 The equivalent circuit model used to fit the experimental data of the composite films