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Enhanced supercapacitor performance by incorporating nickel in manganese oxide

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SUPPLEMENTARY INFORMATION

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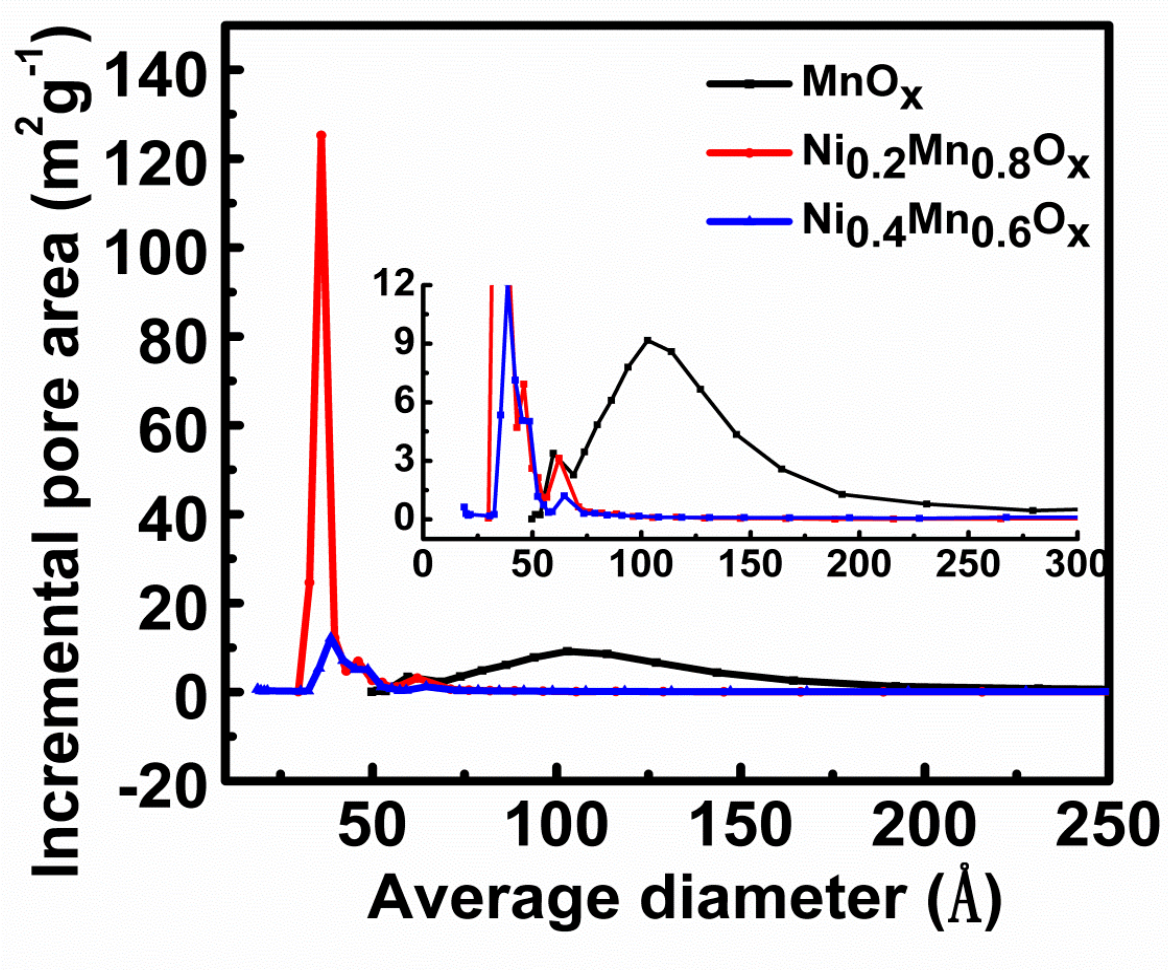

Figure S1 Pore size distribution of $Ni_yMn_{1-y}O_x$; y=0, 0.2 and 0.4.

Pore size distribution of MnO_x demonstrate the presence of mesopores (5-20 nm). It is interesting to note that upon introducing Ni^{+2} ions to MnO_x lattice, the matrial demonstrate a decrease in pore diameter. Typically in $Ni_{0.2}Mn_{0.8}O_x$, majority of pores fall in the optimal sizes of 2-5 nm for supercapacitor which is in agreement with the high surface area and consequently resulted in enhanced capacitance. Inset shows mangnified y axis.

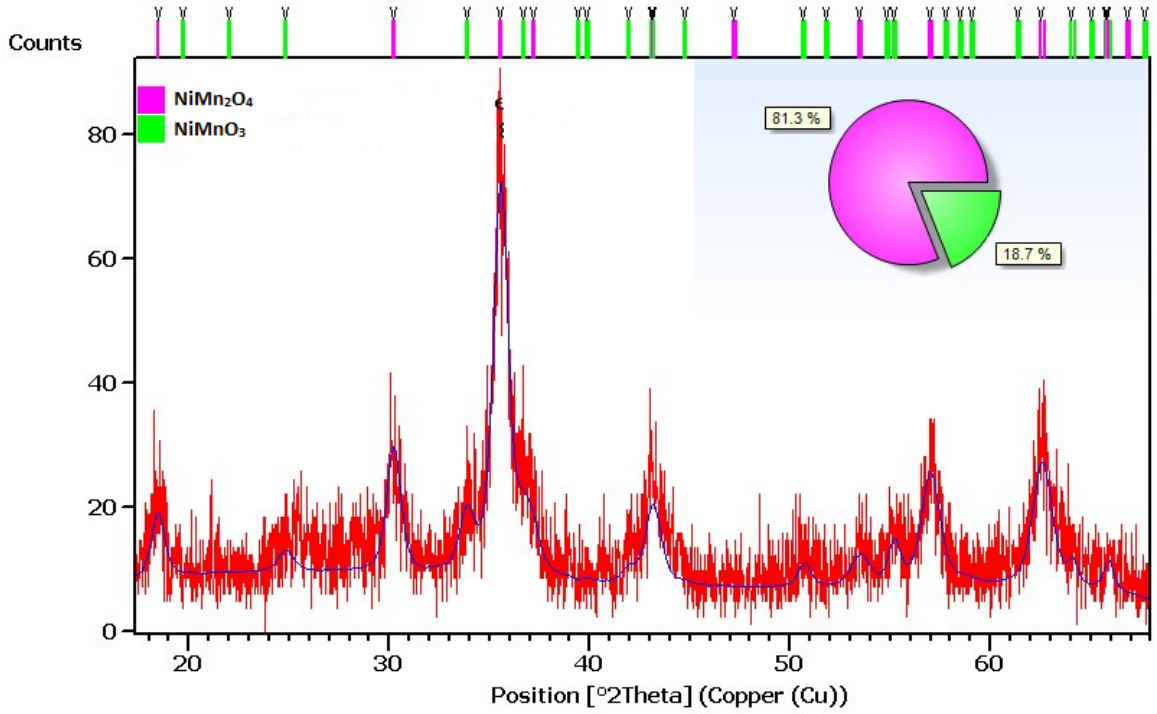

Figure S2: XRD pattern of $Ni_{0.2}Mn_{0.8}O_x$ annealed at 450°C with quantification of phases by Rietveld method.

Quantification of XRD pattern of $Ni_{0.2}Mn_{0.8}O_x$ is achieved by Xpert High Score software via Rietveld method and shows prominent phase $NiMn_2O_4$ (81.3%)

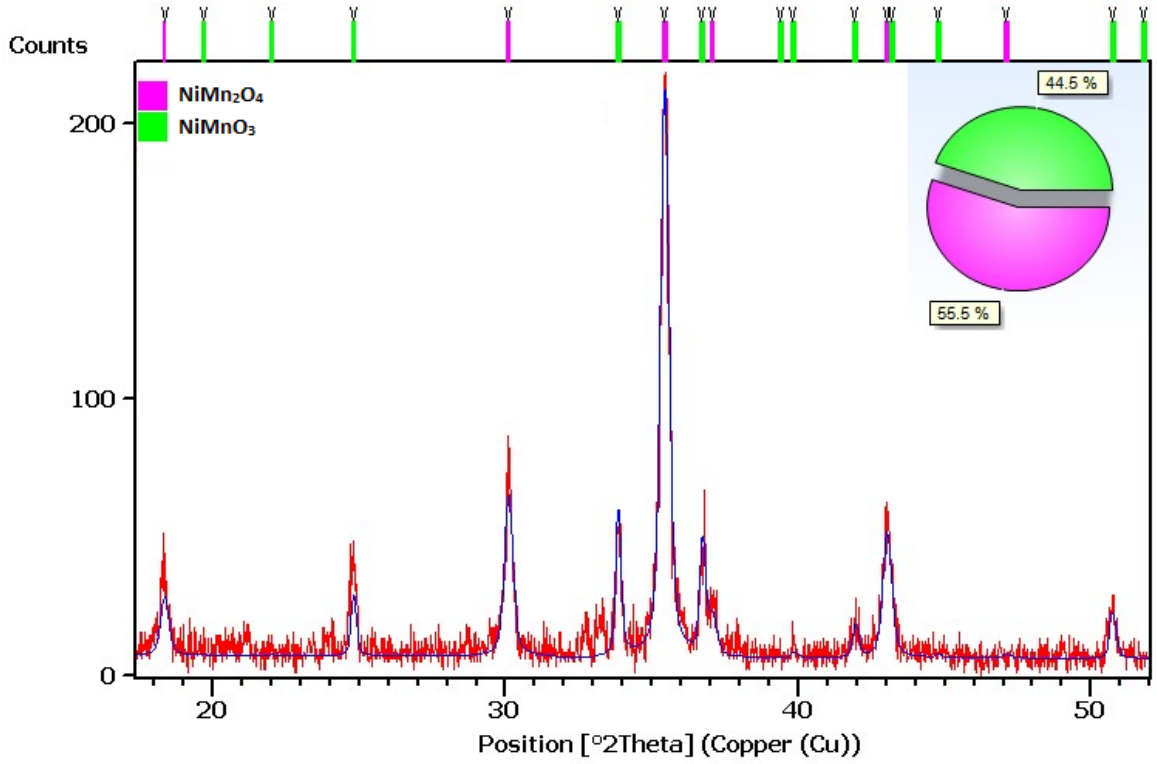

Figure S3: XRD pattern of $Ni_{0.2}Mn_{0.8}O_x$ annealed at 650°C with quantification of phases by Rietveld method.

XRD pattern of $Ni_{0.2}Mn_{0.8}O_x$ shows 55.5% $NiMn_2O_4$ with 44.5% $NiMnO_3$ by quantification via Xpert high Score software using Rietveld method. This is in agreement with the thermal decomposition of $Ni_{0.2}Mn_{0.8}O_x$ at higher temperature with the appearance of two different phases $NiMn_2O_4$ and $NiMnO_3$.