

1 **Non-mercury catalytic acetylene hydrochlorination over Ru**
2 **confined in carbon nanotubes**

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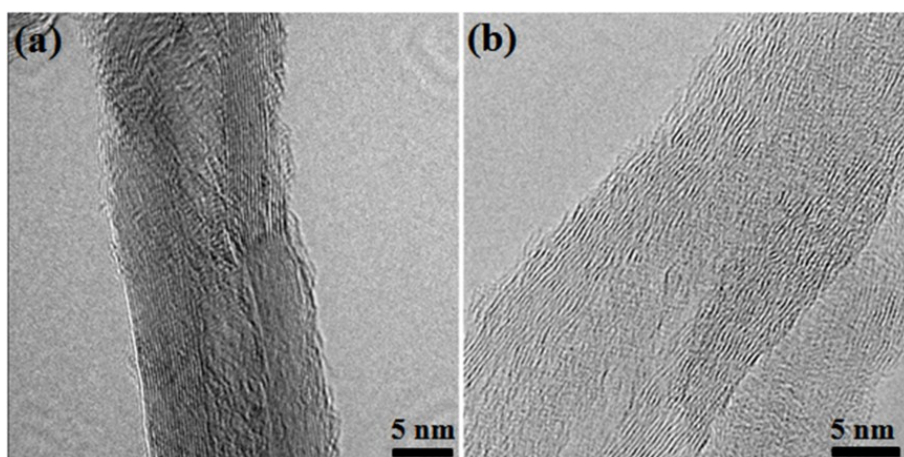
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43 **Fig. S1** TEM images of the nitric acid-treated supports of (a) CNT, and (b) CNT-M.

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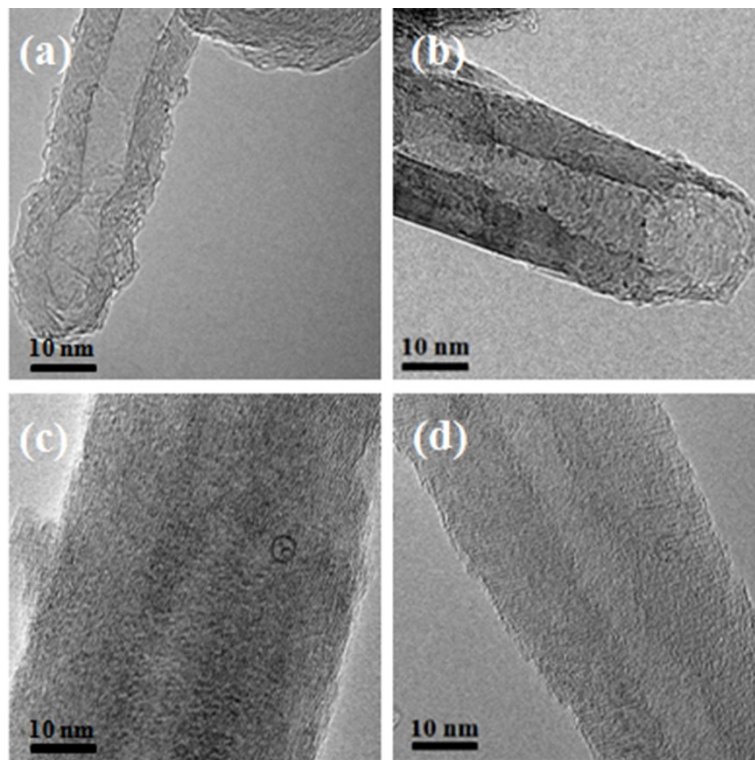
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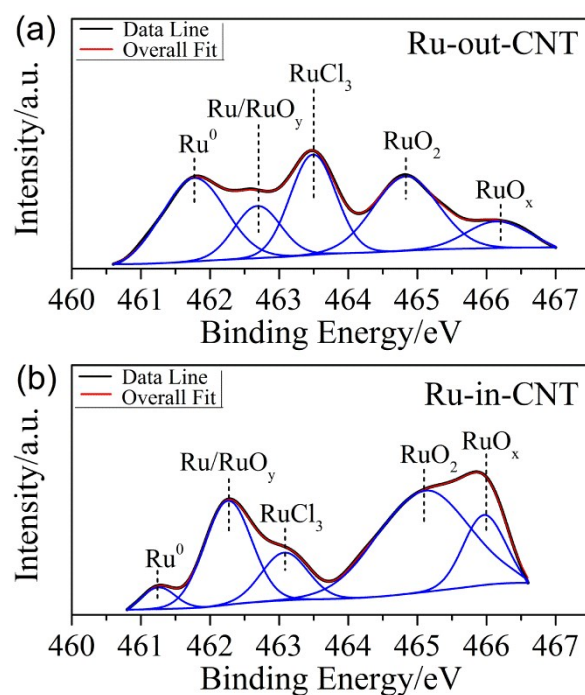
53 **Fig. S2** TEM images of different nanotubes including (a) raw-CNT, (b) CNT, (c) in-CNT, and (d)
54 out-CNT

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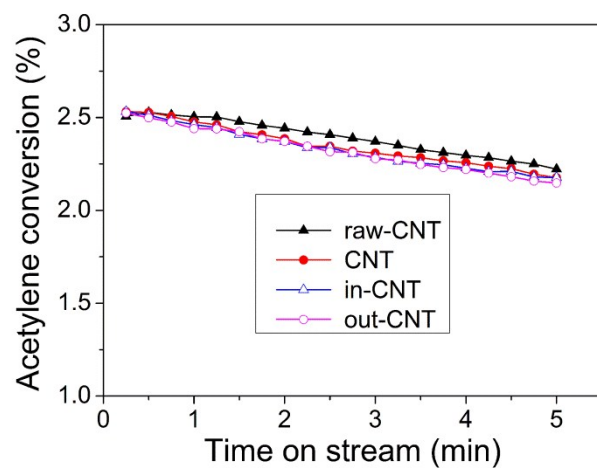
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60 **Fig. S3** Deconvolution profiles of Ru 3p_{3/2} XPS spectra for the fresh catalysts of (a) Ru-out-CNT-
61 M and (b) Ru-in-CNT-M.



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75 **Fig. S4** Catalytic activities of different carbon nanotube supports. Reaction conditions: temperature
 76 (T) = 170 °C; C_2H_2 gas hourly space velocity (GHSV) = 90 h⁻¹; feed volume ratio $V_{HCl}/V_{C_2H_2}$ = 1.1.

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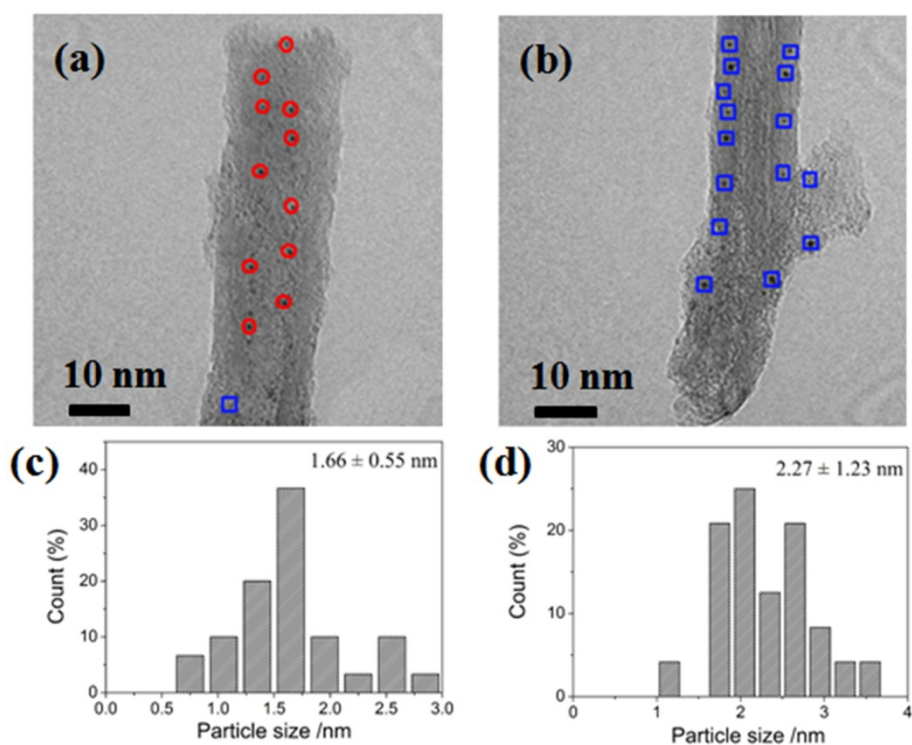
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85 **Fig. S5**TEM images and the particle size distributions of the fresh catalysts of Ru-in-CNT-M (a, c)

86 and Ru-out-CNT-M (b, d). (Red circle: Ru nanoparticles confined within nanochannels of CNT;

87 blue square: Ru nanoparticles located on external surface of CNT.)

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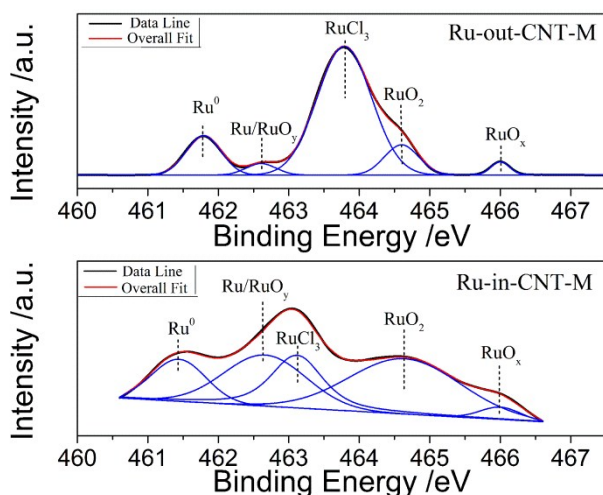
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96 **Fig. S6** Deconvolution profiles of Ru 3p_{3/2} spectra: (a) fresh Ru-out-CNT-M, and (b) fresh Ru-in-
97 CNT-M.

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99 **Table S1** Pore structure parameters of the support CNT-M and the supported Ru catalysts

catalyst	S _{BET} (m ² g ⁻¹)	Pore diameter (nm)
raw-CNT-M ^a	110	5.01
CNT-M ^b	162	5.34
Ru-out-CNT-M	160	5.32
Ru-in-CNT-M	156	5.28

100 ^a: The raw multiwalled CNT-M purchased from Chengdu Organic Chemicals Co., LTD, China.

101 ^b: The CNT-M treated by refluxing in concentrated nitric acid at 140 °C for 14 h, which are used as the support to
102 prepare catalysts.

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104 **Table S2** The binding energy (eV) and relative content (Area %) of ruthenium species in the fresh
105 Ru-in-CNT-M and the fresh Ru-out-CNT-M catalysts

	Ru ⁰	Ru/RuO _y	RuCl ₃	RuO ₂	RuO _x
Catalysts	eV(Area %)	eV(Area %)	eV(Area %)	eV(Area %)	eV(Area %)
Ru-in-CNT-M	461.5(14.3)	462.7(24.7)	463.1(22.5)	464.7(35.5)	466.0(3.0)
Ru-out-CNT-M	461.8(13.7)	462.6(3.5)	463.8(70.1)	464.6(10.4)	466.0(2.3)

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