*Supporting Information for*

# How Can pH Value during Catalyst Preparation Affect the Performance of Vanadium-modified ($SiO_2$/MgO/$MgCl_2$)·$TiCl_x$ Ziegler-Natta Polyethylene Catalysts?

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## 1.GPC curves of ethylene homopolymers

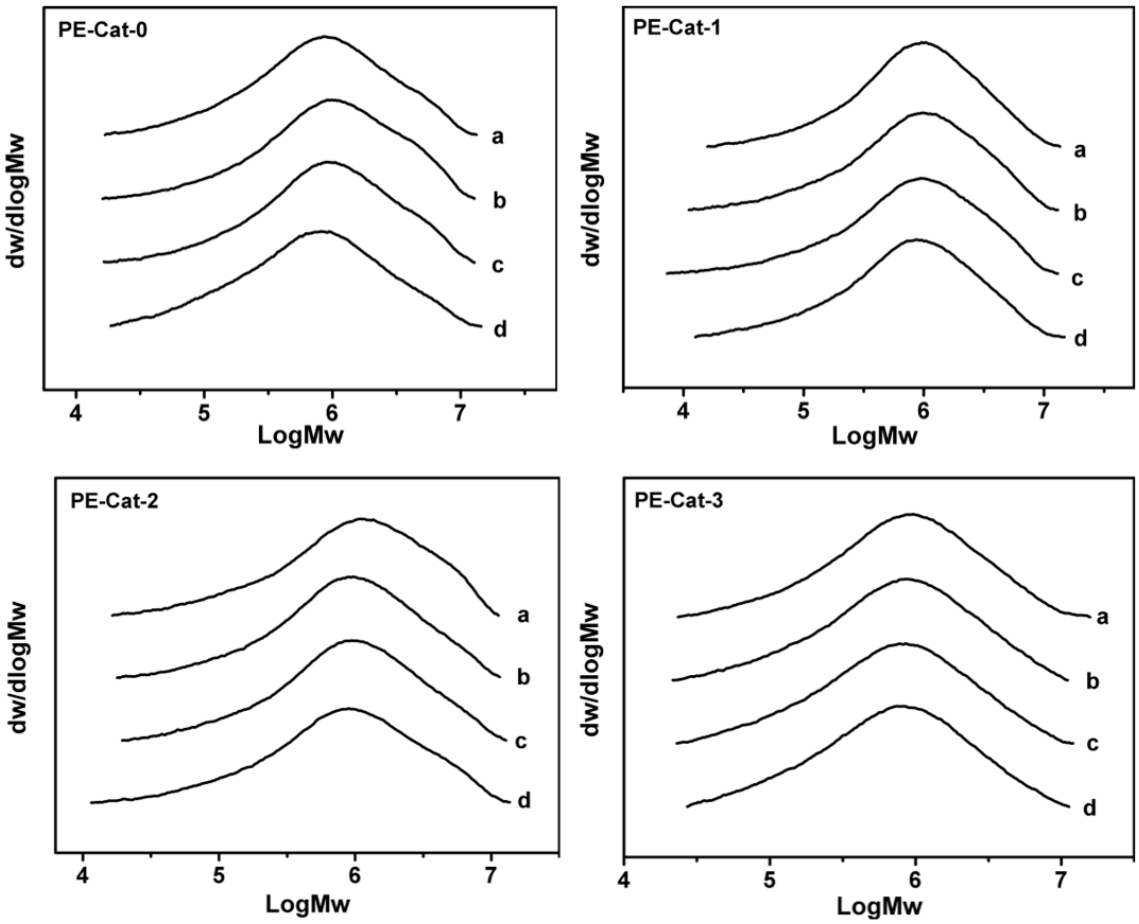


*Figure S1*. GPC curves of ethylene homopolymers obtained from different catalysts with different amount of cocatalyst. PE-Cat-0: (a) Al/Ti=0.75, (b) Al/Ti=1, (c) Al/Ti=2.5, (d) Al/Ti5; PE-Cat-1: (a) Al/Ti=5, (b) Al/Ti=10, (c) Al/Ti=15, (d) Al/Ti=20; PE-Cat-2: (a) Al/Ti=1, (b) Al/Ti=2.5, (c) Al/Ti=5, (d) Al/Ti=10; PE-Cat-3: (a) Al/Ti=2.5, (b) Al/Ti=5, (c) Al/Ti=10, (d) Al/Ti=15. Other polymerization conditions: catalyst 100 mg, ethylene 0.15 MPa, *n*-heptane 80 mL, TIBA, 1 h.

**2.GPC curves of ethylene copolymers**

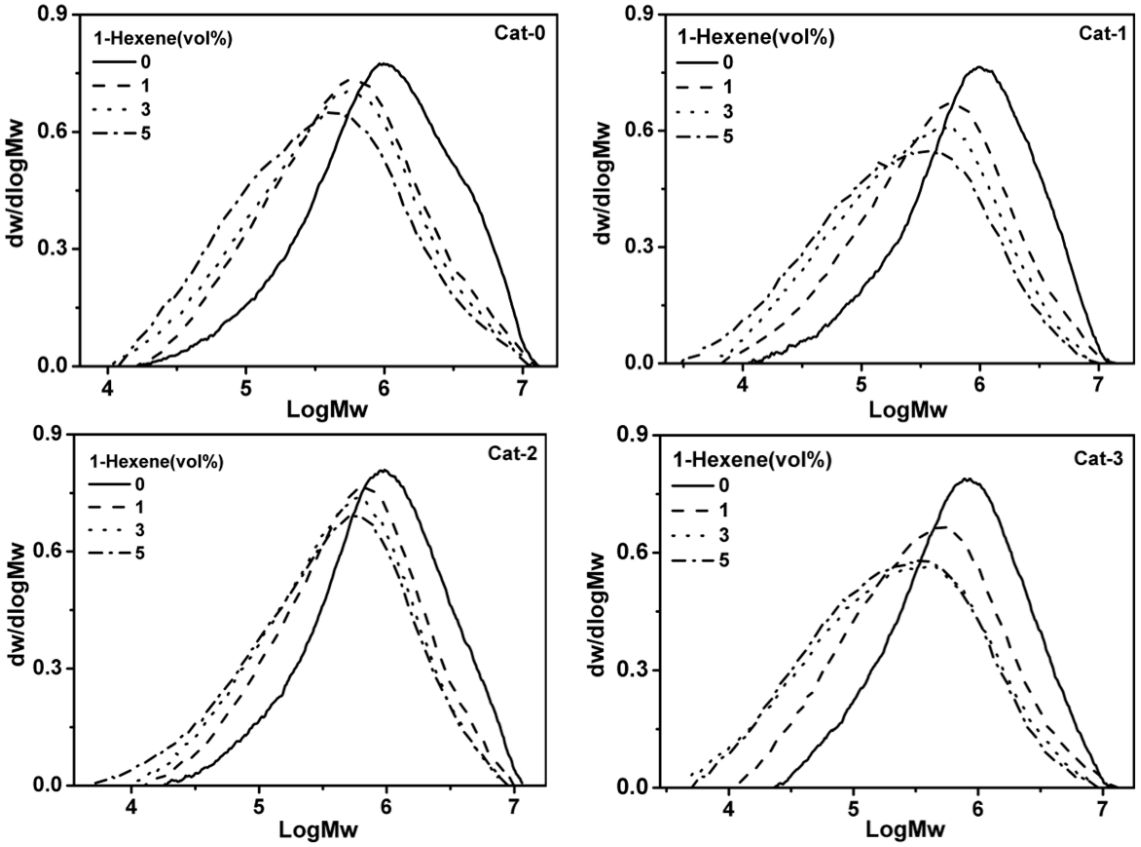


*Figure S2.* GPC curves of ethylene copolymers obtained from different catalysts with different amount of 1-hexene. PE-Cat-0: Al/Ti=1; PE-Cat-1: Al/Ti=10; PE-Cat-2: Al/Ti=2.5; PE-Cat-3: Al/Ti=10. Other polymerization conditions: catalyst 100 mg, ethylene 0.15 MPa, *n*-heptane 80 mL, TIBA, 1 h.

## 3. HT-$^{13}$C NMR spectra of the copolymers

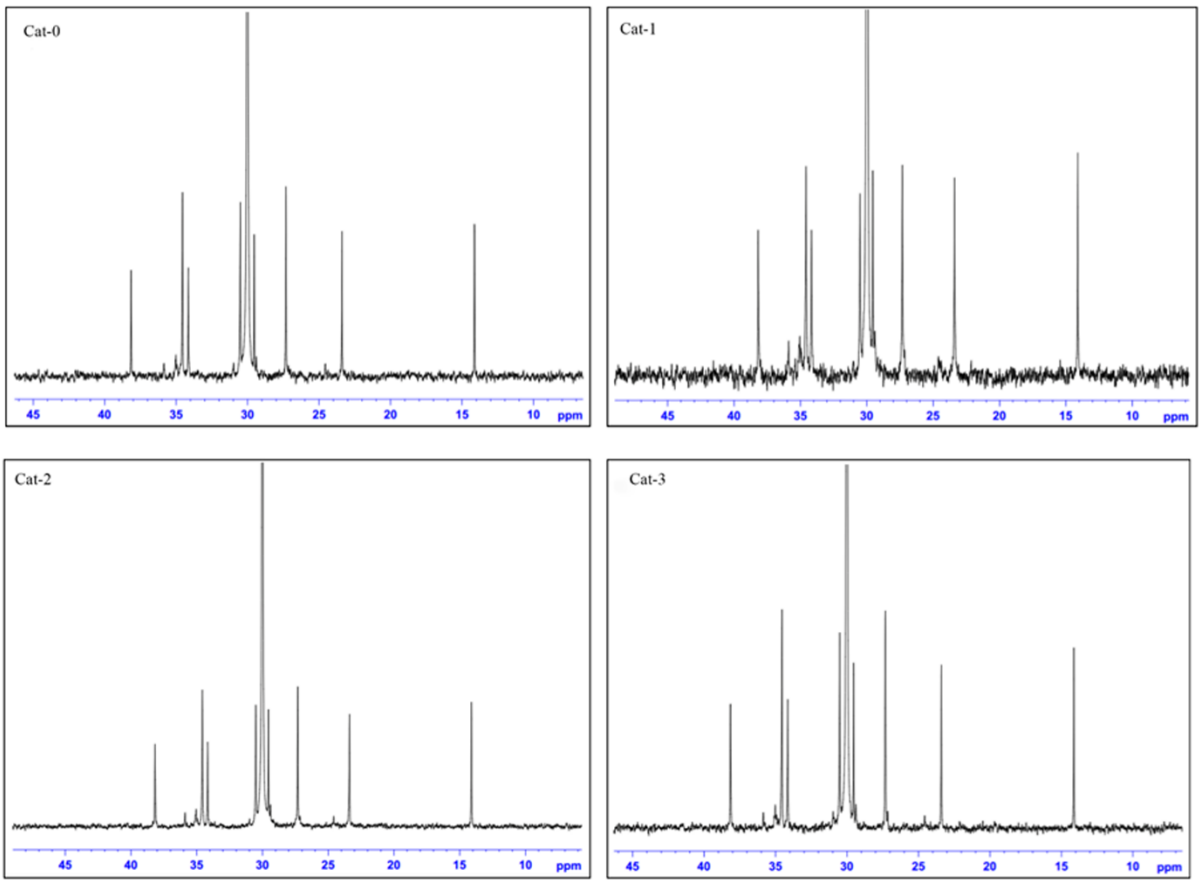


*Figure S3.* HT-$^{13}$C NMR spectra of the copolymers. Cat-0: 3vol% 1-hexene, Al/Ti=1; Cat-1: 3vol% 1-hexene, Al/Ti=10; Cat-2: 3vol% 1-hexene, Al/Ti=2.5; Cat-3: 3vol% 1-hexene, Al/Ti=10. Other polymerization conditions: catalyst 100 mg, ethylene 0.15 MPa, *n*-heptane 80 mL, TIBA, 1 h.

**4.GPC curves of the polymers obtained with/without hydrogen**

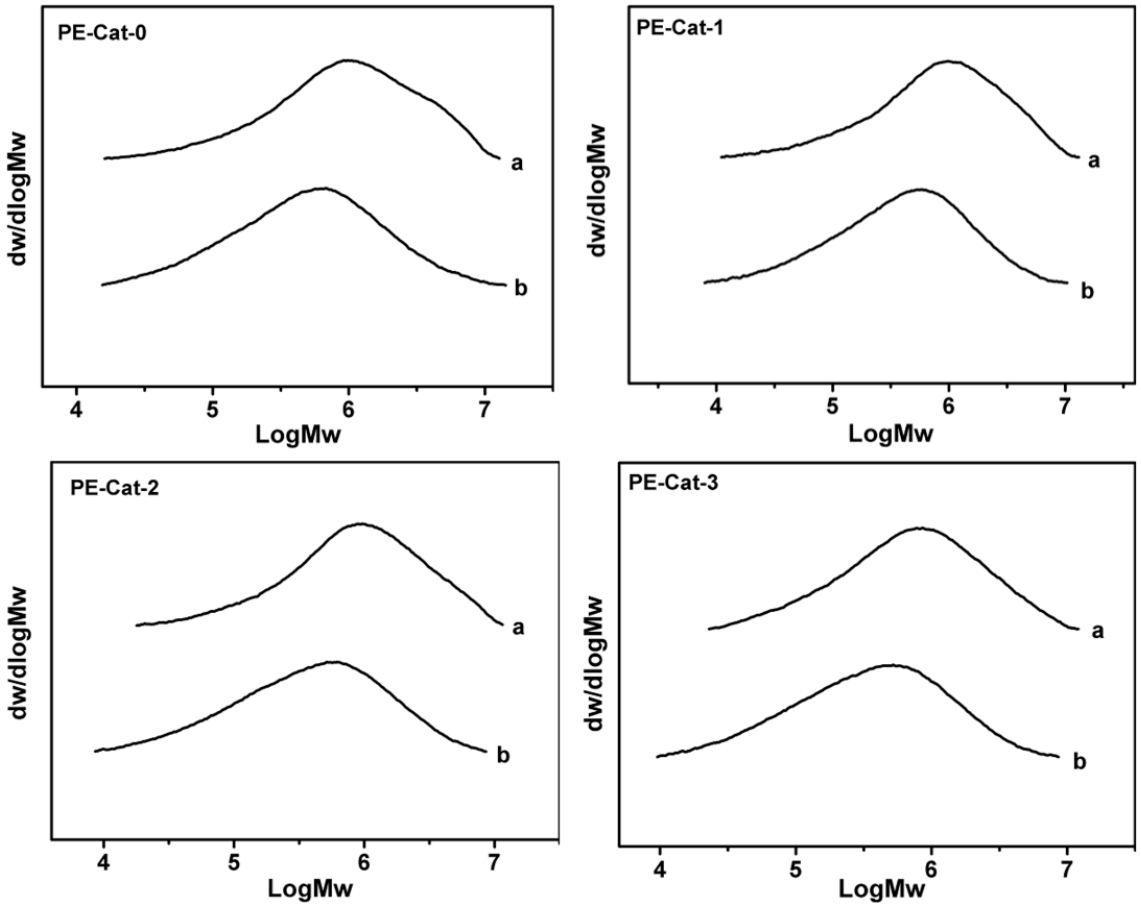


*Figure S4.* GPC curves of ethylene polymers obtained with/without hydrogen at ethylene pressure of 0.15MPa. Conditions: TIBA as cocatalyst, 70$^{o}$C, *n*-heptane 80ml, 1h. PE-Cat-0: Al/Ti=1; PE-Cat-1: Al/Ti=10; PE-Cat-2: Al/Ti=2.5; PE-Cat-3: Al/Ti=10; (a) without $H_2$, (b) with $H_2$.