
One-Pot Pyrolysis to N-Doped Graphene with High-Density Pt Single Atomic Sites as Heterogeneous Catalyst for Alkene Hydrosilylation


Hydrosilylation of Alkenes Catalyzed by Platinum on N-Doped Graphene

**Significance:** Single-atom platinum catalyst supported on N-doped graphene (Pt-ISA/NG) was prepared by heating a mixture of an EDTA–Pt complex and Na₂CO₃ at 850 °C for one hour, followed by removal of the Na₂CO₃ with dilute HCl (eq. 1). Pt-ISA/NG catalyzed the hydrosilylation of alkenes with triethoxysilane to give the corresponding silylated alkanes in ≤99% conversion and ≤99% selectivity (eq. 2).

**Comment:** The authors have previously reported the preparation of the EDTA–Pt complex (Nano Res. 2018, 11, 3088). In the hydrosilylation of octan-1-one with triethoxysilane, Pt-ISA/NG was reused four times without significant loss of its catalytic activity. TEM, EDX, HAADF-STEM, and EXAFS studies on the recovered Pt-ISA/NG indicated that the structural and electronic integrity of Pt-ISA/NG was maintained under the reaction conditions.

**Results:**

\[
\begin{align*}
\text{EDTA} & \quad \text{Pt-ISA/NG} \\
\text{Pt} & \quad \text{(0.25 mol%)} \\
\text{HCl} & \quad \text{p-xylene} \\
\text{Pt-ISA/NG} & \quad \text{R-Si(OEt)₃} \\
\text{Pt-ISA/NG} & \quad \text{R-Si(OEt)₃} \\
\end{align*}
\]

<table>
<thead>
<tr>
<th>Alkene</th>
<th>Conversion</th>
<th>Selectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₃₃C₁₆</td>
<td>94%</td>
<td>99%</td>
</tr>
<tr>
<td>Cl</td>
<td>94%</td>
<td>99%</td>
</tr>
<tr>
<td>O</td>
<td>94%</td>
<td>99%</td>
</tr>
</tbody>
</table>

**Synfacts of the Month**

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