Silylium Ion Catalyzed C–H Arylation of Hydrocarbons

**Significance:** The Nelson group reports a silylium ion catalyzed arylation of C(sp²)–H and C(sp³)–H bonds. By employing 2–5 mol% of precatalyst A in the presence of a trialkylsilane initiator, various aliphatic and aromatic hydrocarbons were arylation with variously functionalized trimethylsilyl fluoro-benzenes.

**Comment:** Previously, catalytic reactions involving highly reactive phenyl cation equivalents were limited to intramolecular transformations. The authors describe the formation of a β-silicon-stabilized phenyl cation (equivalent) II, which is proposed to subsequently undergo intermolecular insertion into the C–H bond of a hydrocarbon present in large excess. Desilylation of the resulting Wheland intermediate furnishes the product and regenerates the catalytically active species I.

**Selected examples:**

- ![Example 1](image1)
  - 58% GC yield

- ![Example 2](image2)
  - 42% GC yield (α/β/γ = 30:10:2)
  - 32% isolated yield

**Proposed catalytic cycle:**

1. **Initiation:**
   - [Ph₃C]+X– + R₃SiH → [Ph₃C]+X–R₃SiH

2. **β-silicon stabilized phenyl cation**
   - I

3. **C–H insertion**
   - II

4. **Regeneration**
   - III

- ![Diagram](image3)

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*Synfacts* 2017, 13(06), 0645 Published online: 16.05.2017

DOI: 10.1055/s-0036-1590436; Reg-No.: 1B04017SF