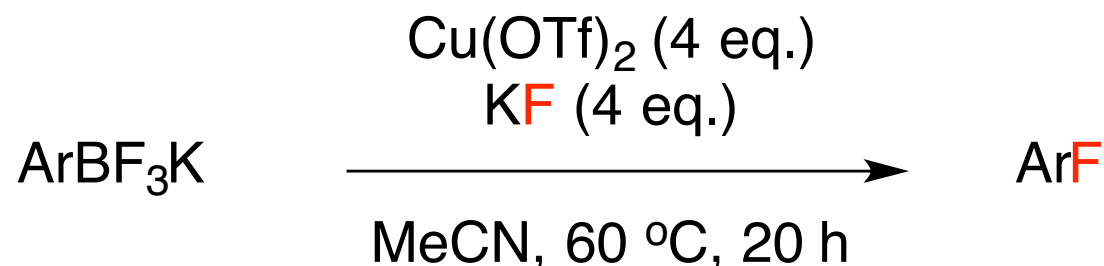


Cu(OTf)₂-Mediated Fluorination of Aryltrifluoroborates with Potassium Fluoride



Ye Y., Schimler S. D., Hanley P.S., and Sanford M.S.
J. Am. Chem. Soc. **135**, 16292-16295 DOI: 10.1021/ja408607r

Michael Frasso
Current Literature
November 9, 2013

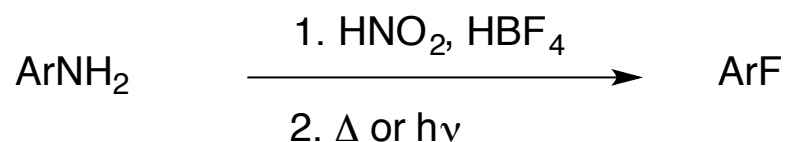
Introduction

- Fluorine present in ~20% of pharmaceuticals and ~30% of agrochemicals
- Used for positron emission tomography (PET)

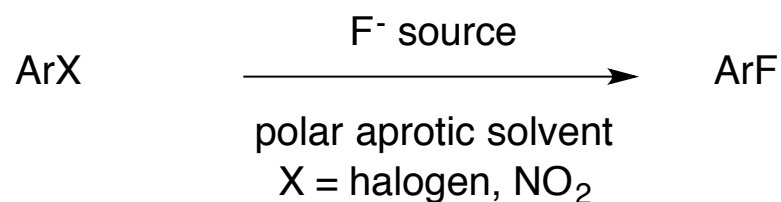
Science **317** 1881-1886

Classical Methods to Prepare Aryl Fluorides

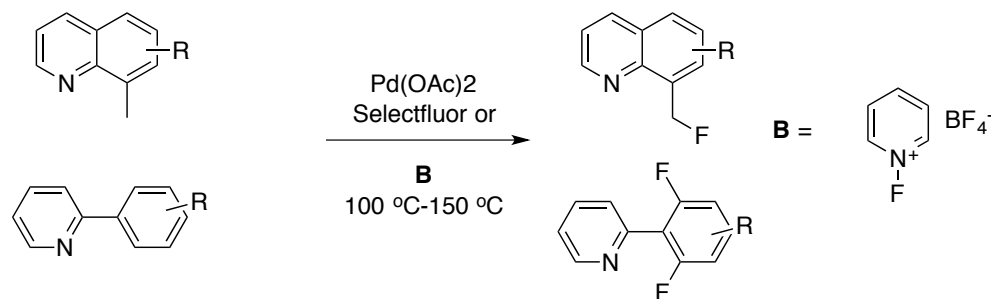
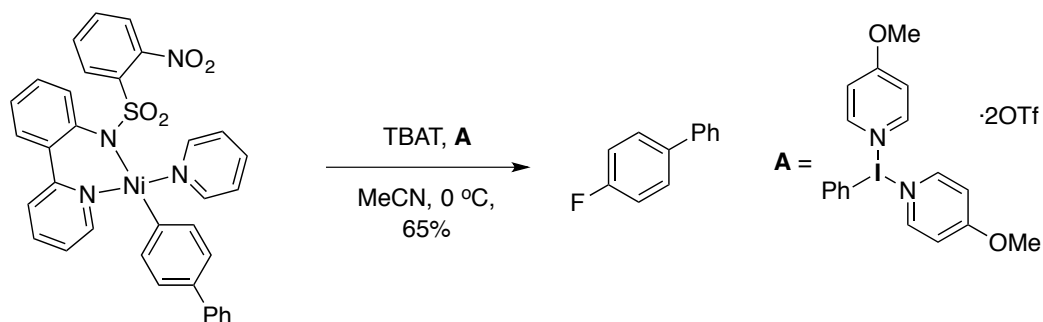
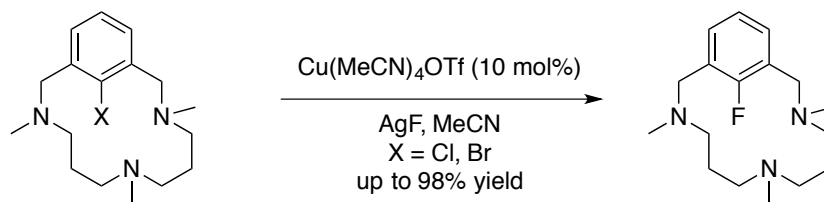
- Balz-Shchiemann reaction



- S_NAr reactions

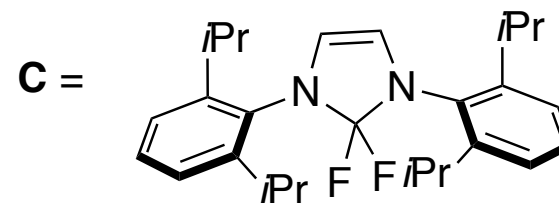
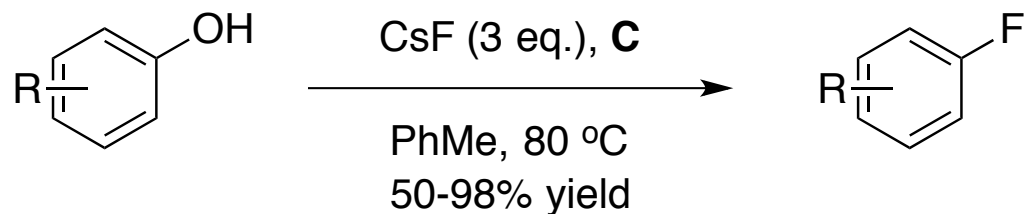
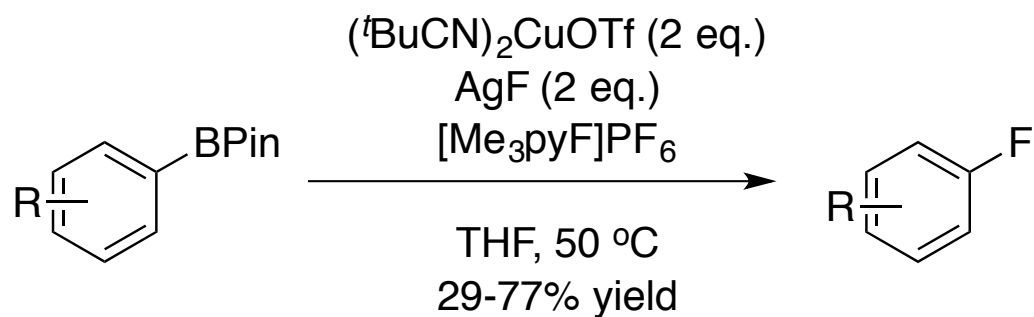
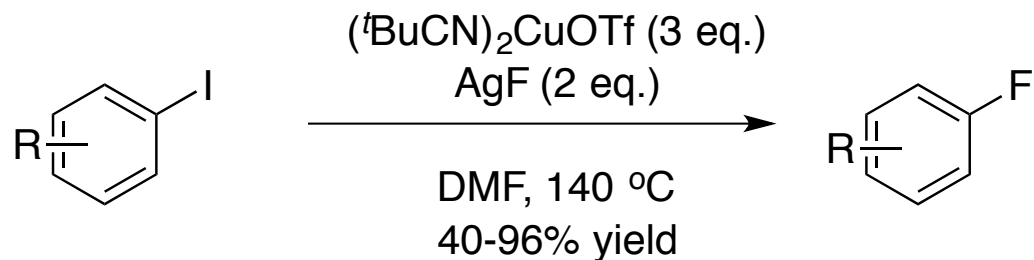


Previous Aromatic Fluorinations



J. Am. Chem. Soc. **133**, 19386–19392
J. Am. Chem. Soc. **134**, 17456-17458
J. Am. Chem. Soc. **128**, 7134-7135

Previous Aromatic Fluorinations

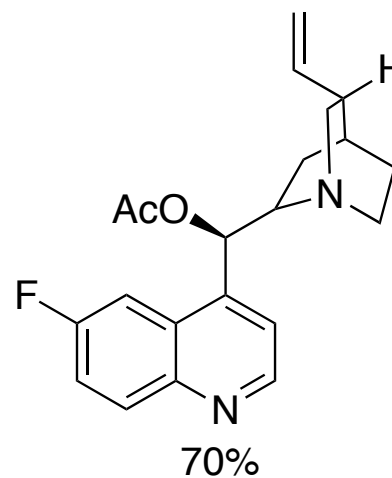
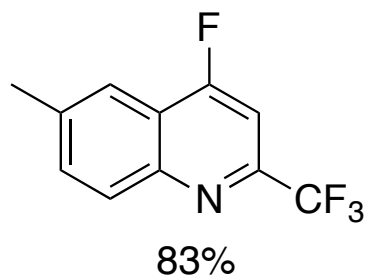
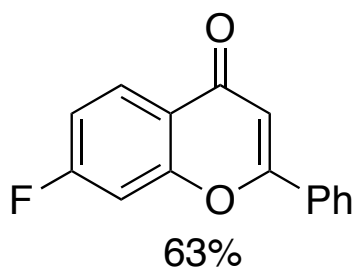
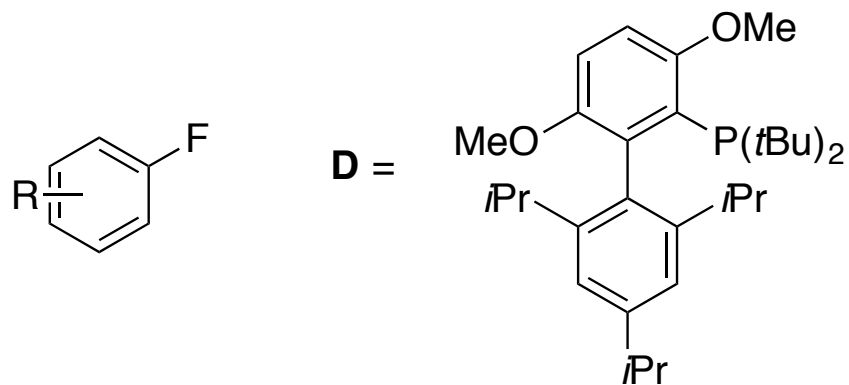
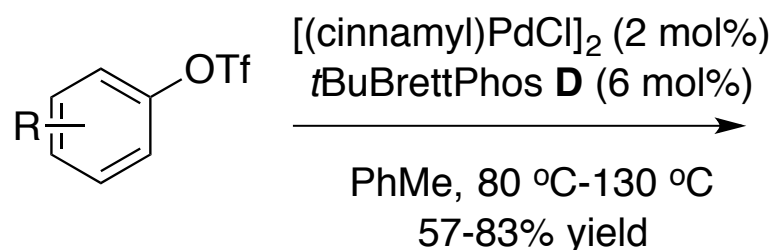


J. Am. Chem. Soc. **134**, 10795-10798

J. Am. Chem. Soc. **135**, 2552-2559

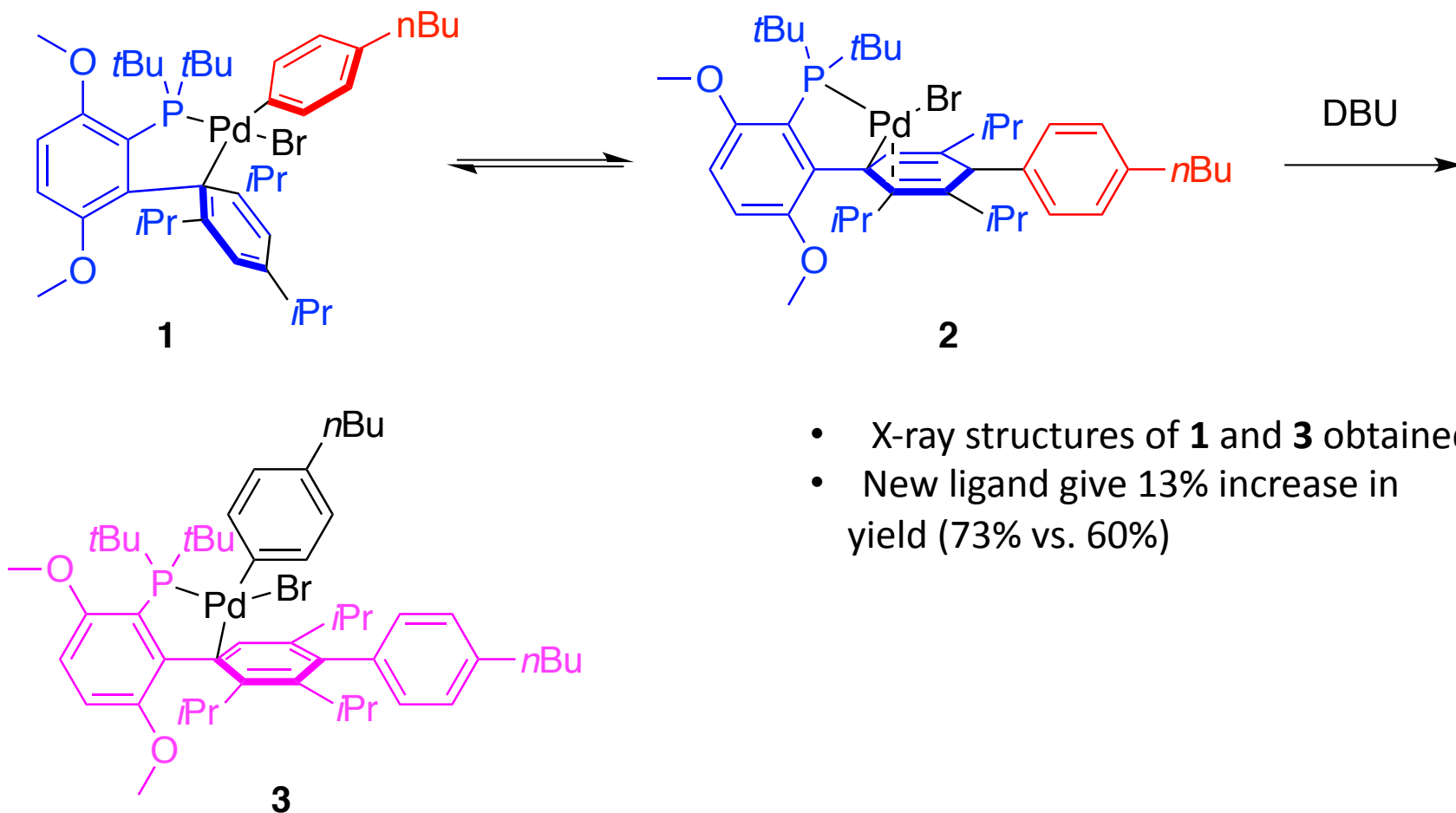
J. Am. Chem. Soc. **133**, 11482-11484

Pd Catalyzed Fluorination of Aryl Triflates



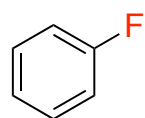
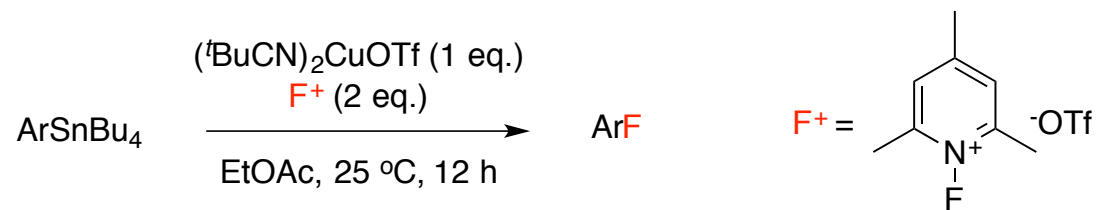
Science **325**, 1661-1664

An Unusual Ligand Transformation

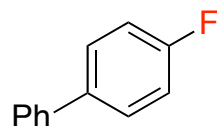


Science **325**, 1661-1664
J. Am. Chem. Soc. **133**, 18106-18109

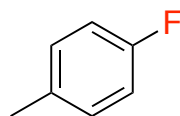
Previous Work From the Sanford Group



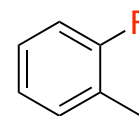
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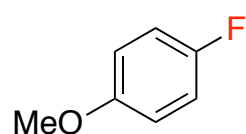
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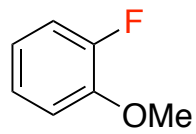
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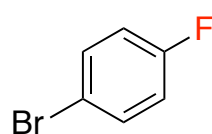
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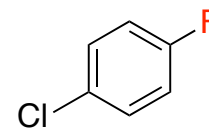
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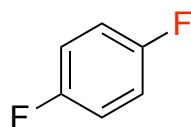
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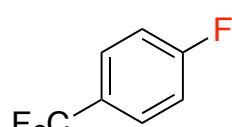
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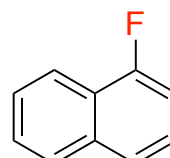
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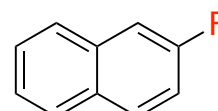
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93%



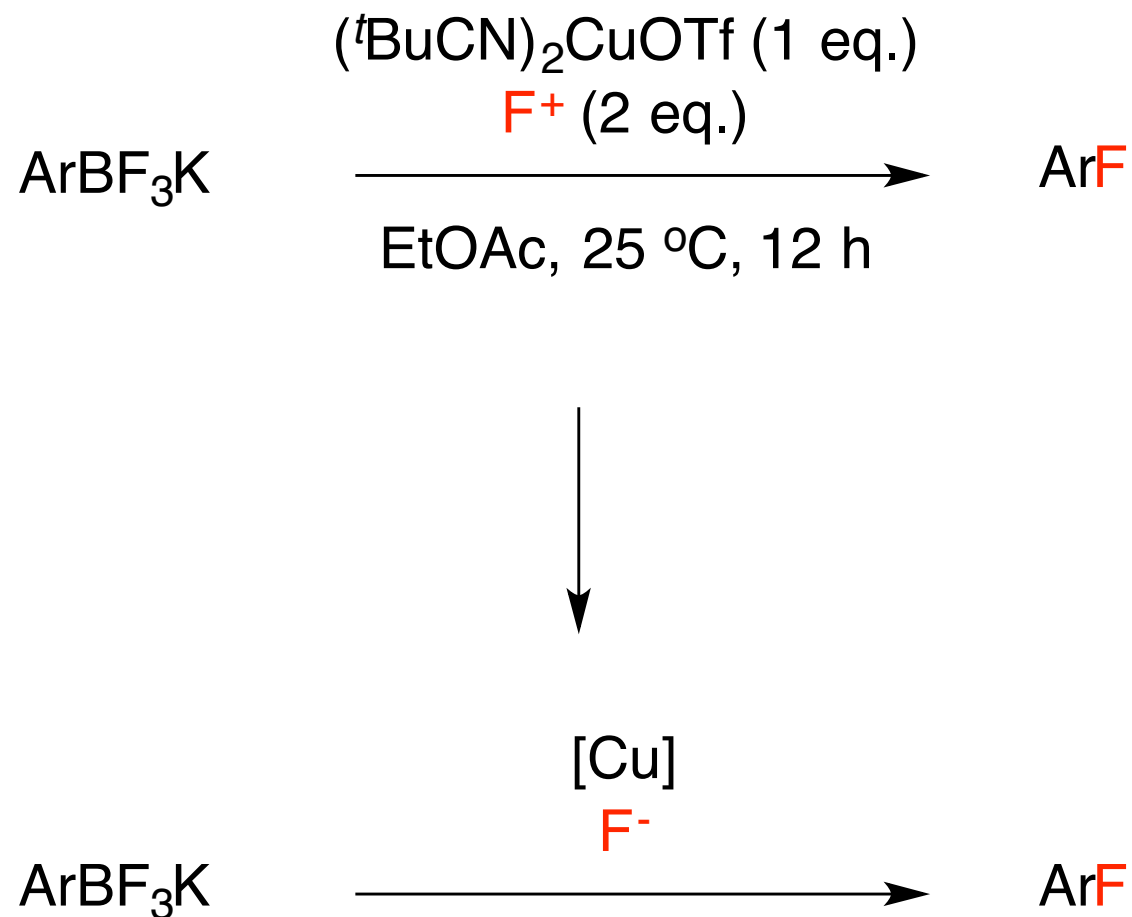
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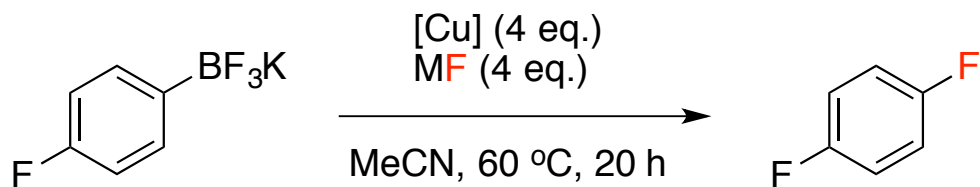
71%

J. Am. Chem. Soc. **135**, 4648-4651

Inspiration for the Current Work



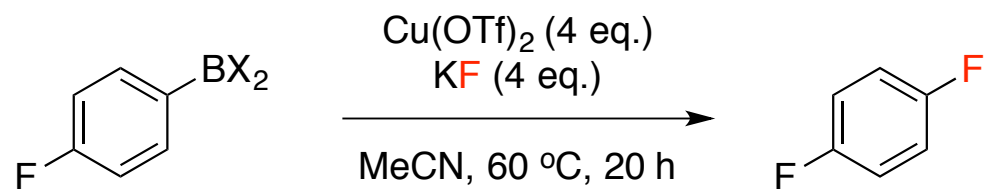
Current Work: Optimization

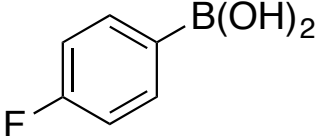
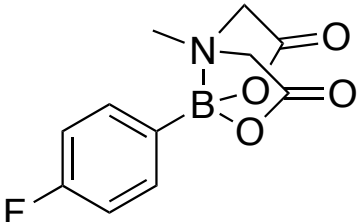
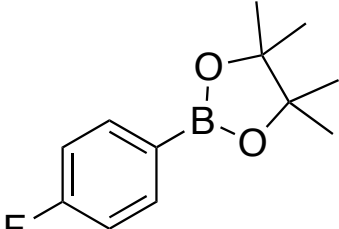


<u>Entry</u>	<u>[Cu]</u>	<u>MF</u>	<u>Yield (%)</u>
1	Cu(OTs) ₂	AgF	nd
2	Cu(OTf) ₂ ·C ₆ H ₆	AgF	nd
3	CuF ₂	AgF	nd
4	Cu(OAc) ₂	AgF	nd
5	(^t BuCN) ₂ Cu(OTf)	AgF	nd
6	Cu(OTf) ₂	AgF	57
7	Cu(OTf) ₂	LiF	nd
8	Cu(OTf) ₂	NaF	62
9	Cu(OTf) ₂	KF	70
10	Cu(OTf) ₂	CsF	65

J. Am. Chem. Soc. **135**, 16292-16295

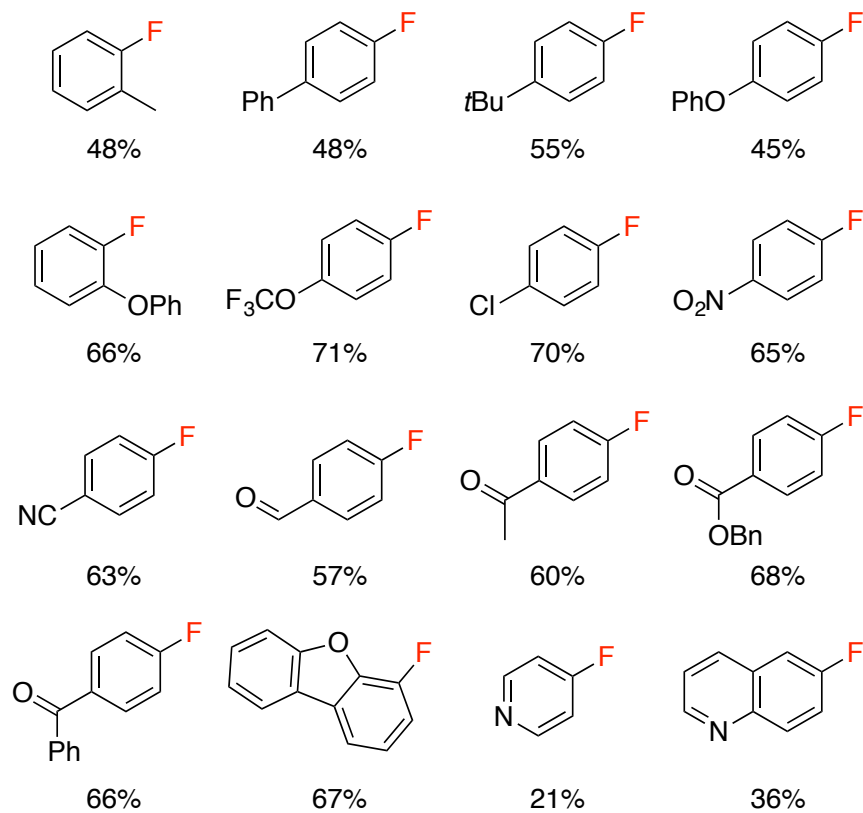
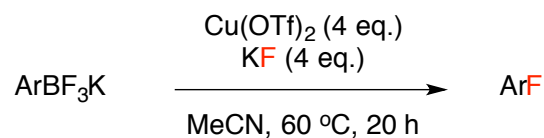
Aryl Boron Reagent Scope



<u>Entry</u>	<u>Substrate</u>	<u>Yield (%)</u>
1		3
2		9
3		56

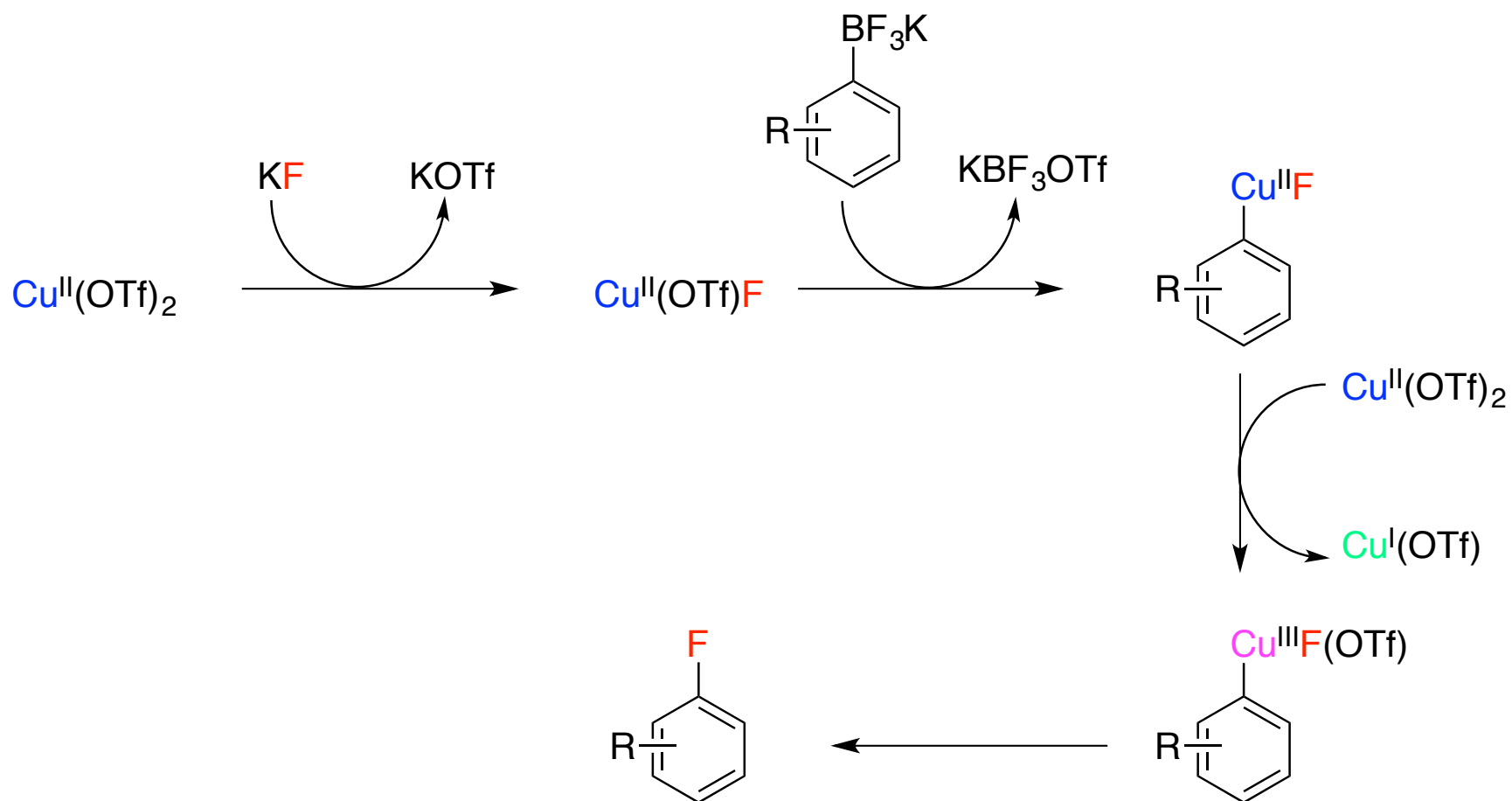
J. Am. Chem. Soc. **135**, 16292-16295

Scope of the Transformation



J. Am. Chem. Soc. **135**, 16292-16295

Mechanism of the Transformation



J. Am. Chem. Soc. **135**, 16292-16295

Improvements Needed

- Scope of the reaction
- Reduce $\text{Cu}(\text{OTf})_2$