

Title: Synthesis and Characterization of Magnetic Molecules for Device Current Modulation

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Abstract: Presented herein is the synthesis and characterization of Ru₂ compounds that will be used to determine the capacity of molecular spin to modulate the current of a semiconductor conduction channel. The diruthenium complexes being investigated, Ru₂(*ap*)₄-*p*-CC-Ph-NH₂, **1**, (*ap* = 2-anilinopyridinate) Ru₂(*ap*)₄-*m*-CC-Ph-NH₂, **2**, and Ru₂(*ap*)₄-*p*-CC-Ph-CC-H, **3**, have a ground state of $S = 3/2$. Alternatively, the diruthenium compound Ru₂(DMBA)₄-(*p*-CC-Ph-CHO)₂, **4**, (DMBA = *N, N'*-dimethylbenzamidinate) has a ground state of $S = 1$. The amine in **1** and **2** will be oxidized to a diazonium via *t*-BuONO and subsequently deposited onto passivated Si(111) electrochemically giving a direct aryl functionalization. Compound **3** will be deposited onto the Si surface thermally or photochemically to yield a Si-C=C linkage. A layer of *p*-ethynylaniline will be deposited onto silicon via thermal or photochemical deposition at which point the aldehyde of **4** can undergo a Schiff base condensation with the amine of the deposited monolayer. This will also allow for successive condensations between phenylenediamine and **4**, allowing for increased charge density on silicon.