This thesis primarily describes the development of amidinato silylene complexes for the purposes of bond activation and catalysis. Firstly, a paramagnetic dimeric amidinato cobaltosilylene was demonstrated to catalyze the regioselective C–H functionalization of arylpyridines by alkynes. It can also catalyze Kumada-type cross-coupling reactions. Next, an amidinato silicon(I)–iron(II) dimer was shown to be active in the catalytic hydroboration of carbonyl compounds in the absence of auxiliary reducing agents. An endocyclic boronium salt ligated by two amidinato silylenes then exhibited the ability to cleave the strong and inert H–H bond under ambient conditions. Lastly, an amidinato amidosilylene performed the challenging B–H activation.