In 2013, our laboratory developed the use of $N$-sulfinyl metallodienamines (NSMDs) for the concise asymmetric total syntheses of *Aspidosperma* alkaloids $(-)$-tabersonine and $(-)$-vincadifformine. We showed that these chiral synthetic intermediates react with electron-deficient alkenes in a domino Michael-Mannich sequence to afford cycloadducts in high yields and with good diastereoselectivities. We have expanded the scope of NSMD methodology by showing they can react with aldehydes in a vinylogous aldol fashion and oxidants to afford alpha-hydroxy carbonyl compounds. In 2017, we reported a 14-step asymmetric synthesis of $(-)$-albocycline using this novel methodology. We are currently engaged in the first total synthesis of bis-*Aspidosperma* alkaloid $(-)$-melodinine K using NSMDs.