What is claimed is:

1. A process for preparing a diorganotin dihalide compound of the formula R_2SnX_2 wherein: **(i)** R is an unsubstituted linear C_1-C_{10} alkyl group, a linear C_1-C_6 alkyl group substituted with a halogen, a linear C_1-C_6 alkyl group substituted with an amino group, an unsubstituted branched C_3-C_{10} alkyl group, a branched C_3-C_{10} alkyl group substituted with a halogen, a branched C_3-C_{10} alkyl group substituted with an amino group, an unsubstituted amine, a substituted amine, -$Si(CH_3)_3$, a C_3-C_8 unsubstituted cyclic alkyl group, a C_3-C_8 cyclic alkyl group substituted with a halogen, a C_3-C_8 cyclic alkyl group substituted with an amino group, a C_3-C_8 unsubstituted aromatic group, a C_3-C_8 aromatic group substituted with a halogen, a C_3-C_8 aromatic group substituted with an amino group, a C_3 to C_{10} heterocyclic group, a C_3 to C_{10} alkenyl group and a C_3 to C_{10} alkynyl group, and

(ii) X is Cl, Br, F or I; and

wherein the diorganotin dihalide compound as-synthesized is free of R_4Sn, R_3SnX and $RSnX_3$,

comprising the steps of

(i) forming a mixture of diorganotin oxide (R_2SnO) where (i) R is an unsubstituted linear C_1-C_{10} alkyl group, a linear C_1-C_6 alkyl group substituted with a halogen, a linear C_1-C_6 alkyl group substituted with an amino group, an unsubstituted branched C_3-C_{10} alkyl group, a branched C_3-C_{10} alkyl group substituted with a halogen, a branched C_3-C_{10} alkyl group substituted with an amino group, an unsubstituted amine, an substituted amine, -$Si(CH_3)_3$, a C_3-C_8 unsubstituted cyclic alkyl group, a C_3-C_8 cyclic alkyl group substituted with a halogen, a C_3-C_8 cyclic alkyl group substituted with an amino group, a C_3-C_8 unsubstituted aromatic group, a C_3-C_8 aromatic group substituted with a halogen, a C_3-C_8 aromatic group substituted with an amino group, a C_3 to C_{10} heterocyclic group, a C_3 to C_{10} alkenyl group and a C_3 to C_{10} alkynyl group with an organic solvent;

(ii) adding an aqueous solution of an acid of the formula HX wherein X is one of Cl, Br, F or I to the mixture of step (i) to form a biphasic mixture comprising an organic phase and an aqueous phase;

(iii) stirring the biphasic mixture of step (ii) for a period of time;

(iv) separating the organic phase and an aqueous phase of the biphasic mixture;

(v) optionally further extracting the aqueous phase;

(vi) isolating the compound of the formula R_2SnX_2; and

(vii) optionally purifying the compound of the formula R_2SnX_2.

2. The process of claim 1, wherein R is a methyl group.

3. The process of claim 1, wherein R is an ethyl group.

4. The process of claim 1, wherein X is Cl.

5. The process of claim 1, wherein R is a methyl group and X is Cl.

6. The process of claim 1, wherein R is an ethyl group and X is Cl.

7. The process of claim 1, wherein the diorganotin oxide is dimethytin oxide ($(Me)_2SnO$).

8. The process of claim 1, wherein the diorganotin oxide is diethytin oxide ($(Et)_2SnO$).

9. The process of claim 1, wherein the solvent comprises one or more of a linear, branched, cyclic or poly-ether, linear, branched, or cyclic alkanes, alkenes, aromatics and halocarbons and combinations thereof.

10. The process of claim 1, wherein the solvent comprises methylene chloride.

11. The process of claim 1, wherein the aqueous acid comprises HCl.

12. The process of claim 1, wherein the aqueous acid comprises one or more of HBr, HF and HI.

13. The process of claim 1, wherein the diorganotin oxide is dimethyltin oxide ($(Me)_2SnO$), the solvent comprises methylene chloride and the aqueous acid comprises HCl.

14. The process of claim 1, wherein the diorganotin oxide is diethyltin oxide ($(Et)_2SnO$), the solvent comprises methylene chloride and the aqueous acid comprises HCl.

15. The process of claim 1, wherein the step (iii) period of time is from 10 minutes to 12 hours.

16. The process of claim 1, wherein the compound of the formula R_2SnX_2 is isolated using a solvent comprising toluene.

17. The process of claim 1, wherein the compound of the formula R_2SnX_2 is purified via one or more of distillation and crystallization.

18. The process of claim 1, wherein some or all of the steps of the process are conducted at a temperature of between -40 °C to a temperature which is at or below the boiling point of the solvent(s) employed.

19. The process of claim 1, wherein some or all of the steps of the process are conducted at a temperature of between -40 °C to 100 °C.

20. The process of claim 1, wherein yield of compound of the formula R_2SnX_2 is above 80%.

21. The process of claim 1 further comprising converting the compound of the formula R_2SnX_2 to a compound of formula R_2SnL_2, wherein L is one or more of an alkoxy ($-OR^1$), an organoamino ($-NR^2R^3$), a carboxylate ($-OOCR^4$), an amidinato ($-R^5N(CR^6)NR^7$, an imido ($-N(COR^8)(COR^9)$, an alkynido ($-CCR^{10}$), wherein R^{1-10} are each independently selected from hydrogen, a linear C_1 to C_{10} alkyl group, a branched C_3 to C_{10} alkyl group, a C_3 to C_{10} cyclic alkyl group, a C_3 to C_{10} heterocyclic group, a C_3 to C_{10} alkenyl group, a C_3 to C_{10} alkynyl group, and a C_4 to C_{10} aryl group with the proviso that R^1 cannot be hydrogen and R^{2-3} cannot both be hydrogen.

22. The process of claim 1 further comprising converting a compound of the formula R_2SnX_2 according to any of claims 1-10 to the compound of formula $RSnL_3$, wherein L is one or more of an alkoxy ($-OR^1$), an organoamino ($-NR^2R^3$), a carboxylate ($-OOCR^4$), an amidinato ($-R^5N(CR^6)NR^7$, an imido ($-N(COR^8)(COR^9)$, an alkynido ($-CCR^{10}$), wherein R^{1-10} are each independently selected from hydrogen, a linear C_1 to C_{10} alkyl group, a branched C_3 to C_{10} alkyl group, a C_3 to C_{10} cyclic alkyl group, a C_3 to C_{10} heterocyclic group, a C_3 to C_{10} alkenyl group, a C_3 to C_{10} alkynyl group, and a C_4 to C_{10} aryl group with the proviso that R^1 cannot be hydrogen and R^{2-3} cannot both be hydrogen.

23. The process of claim 1 further comprising converting the compound of the formula R_2SnX_2 according to any of claims 1-10 to the compound of the formula R_nSnX_{4-n} wherein n=1-3 and X is a ligand having a hydrolysable bond with Sn.

24. The process of claim 1 further comprising converting the compound of the formula R_2SnX_2 to one or more of $^tBu_2Sn(NEt_2)_2$, $^tBu_2Sn(NMe_2)_2$, $^nBu_2Sn(NMe_2)_2$, $^iPr_2Sn(NMe_2)_2$, $^tAm_2Sn(NMe_2)_2$, $(cyclopentyl)_2Sn(NMe_2)_2$, $Me_2Sn(NMe_2)_2$, $(cyclobutyl)_2Sn(NMe_2)_2$, $(cyclopentyl)_2Sn(NMe_2)_2$, $(cyclohexyl)_2Sn(NMe_2)_2$, $((C_6H_5)CH_2)_2Sn(NMe_2)_2$, $((C_6H_5)(CH_3)CH)_2Sn(NMe_2)_2$, $((C_6H_5)(CH_3)_2C)_2Sn(NMe_2)_2$, $((CH_3)_2(CN)C)_2Sn(NMe_2)_2$, $((CH_3)(CN)CH)_2Sn(NMe_2)_2$, $^tBu_2Sn(O^tBu)_2$, $Me_2Sn(O^tBu)_2$, $^nBu_2Sn(O^tBu)_2$, $^iPr_2Sn(O^tBu)_2$, $^tAm_2Sn(O^tBu)_2$, $(cyclobutyl)_2Sn(O^tBu)_2$, $(cyclopentyl)_2Sn(O^tBu)_2$, $(cyclohexyl)_2Sn(O^tBu)_2$, $((C_6H_5)CH_2)_2Sn(O^tBu)_2$, $((C_6H_5)(CH_3)CH)_2Sn(O^tBu)_2$, $((C_6H_5)(CH_3)_2C)_2Sn(O^tBu)_2$, $((CH_3)_2(CN)C)_2Sn(O^tBu)_2$, $((CH_3)(CN)CH)_2Sn(O^tBu)_2$, $^tBu_2Sn(O^tAm)_2$, $Me_2Sn(O^tAm)_2$, $^nBu_2Sn(O^tAm)_2$, $^iPr_2Sn(O^tAm)_2$, $^tAm_2Sn(O^tAm)_2$ $(cyclobutyl)_2Sn(O^tAm)_2$, $(cyclopentyl)_2Sn(O^tAm)_2$, $(cyclohexyl)_2Sn(O^tAm)_2$, $((C_6H_5)CH_2)_2Sn(O^tAm)_2$, $((C_6H_5)(CH_3)CH)_2Sn(O^tAm)_2$, $((C_6H_5)(CH_3)_2C)_2Sn(O^tAm)_2$, $((CH_3)_2(CN)C)_2Sn(O^tAm)_2$, $((CH_3)(CN)CH)_2Sn(O^tAm)_2$, $^tBuSn(NEt_2)_3$, $^tBuSn(NMe_2)_3$, $^tBuSn(O^tBu)3$, $^iPrSn(NMe_2)_3$, $MeSn(O^tBu)_3$, $^nBuSn(O^tBu)_3$, $^nBuSn(NMe_2)_3$, $(CH_3)_3CSn(NMe_2)_3$, $(CH_3)_2CHSn(NMe_2)_3$, $(CH_3)_2(CH_3CH_2)CSn(NMe_2)_3$, $cyclopentylSn(NMe_2)_3$, $CH_3Sn(NMe_2)_3$, $cyclobutylSn(NMe_2)_3$, $cyclopentylSn(NMe_2)_3$, $cyclohexylSn(NMe_2)_3$ $(C_6H_5)CH_2Sn(NMe_2)_3$, $(C_6H_5)(CH_3)CHSn(NMe_2)_3$, $(C_6H_5)(CH_3)_2CSn(NMe_2)_3$, $(CH_3)_2(CN)CSn(NMe_2)_3$, $(CH_3)(CN)CHSn(NMe_2)_3$, $(CH_3)_3CSn(O^tBu)_3$, $(CH_3)_2CHSn(O^tBu)_3$, $(CH_3)_2(CH_3CH_2)CSn(O^tBu)_3$, $(CH_2)_2CHSn(O^tBu)_3$, $CH_3Sn(O^tBu)_3$, $(CH_2)_3CHSn(O^tBu)_3$, $(CH_2)_4CHSn(O^tBu)_3$, $(C_6H_5)CH_2Sn(O^tBu)_3$, $(C_6H_5)(CH_3)CHSn(O^tBu)_3$, $(C_6H_5)(CH_3)_2CSn(O^tBu)_3$, $(CH_3)_2(CN)CSn(O^tBu)_3$, $(CH_3)(CN)CHSn(O^tBu)_3$, $(CH_3)_3CSn(O^tAm)_3$, $(CH_3)_2CHSn(O^tAm)_3$, $(CH_3)_2(CH_3CH_2)CSn(O^tAm)_3$, $cyclopropylSn(O^tAm)_3$, $CH_3Sn(O^tAm)_3$, $cyclobutylSn(O^tAm)_3$, $cyclopentylSn(O^tAm)_3$, $cyclohexylSn(O^tAm)_3$, $(C_6H_5)CH_2Sn(O^tAm)_3$, $(C_6H_5)(CH_3)CHSn(O^tAm)_3$, $(C_6H_5)(CH_3)_2CSn(O^tAm)_3$, $(CH_3)_2(CN)CSn(O^tAm)_3$, $(CH_3)(CN)CHSn(O^tAm)$.