CLAIMS

1. A process for preparing silver nanowires, the process comprising:

allowing a first-stage reaction mixture to react for a first period of time, the first-stage reaction mixture comprising a polyol solvent, a first portion of a silver salt, a capping agent, a chloride source and a co-additive; and

after the first period of time, gradually adding a second portion of the silver salt to the first-stage reaction mixture over a second period of time in a rate for maintaining a concentration of less than 0.1% w/w of the silver salt in a total reaction mixture thus formed,

wherein the co-additive is:

(a) a soluble salt having an anion selected from the group consisting of perchlorate, tetrafluoroborate, hexafluorophosphate, triflate, phosphate, thiosulphate, and salicylate;

(b) a nitrogen-containing base selected from $N(R^1)_3$, optionally substituted pyridine, optionally substituted pyrimidine, optionally substituted pyrazine, and optionally substituted pyridazine, or optionally substituted triazine, wherein each R^1 at each occurrence is the same or different and independently hydrogen, optionally substituted alkyl, optionally substituted aralkyl, or two of the R′ groups together with the nitrogen to which they are attached form a N-heterocycle ring;

(c) optionally substituted phenol or hydroquinone; or

(d) optionally substituted aniline, and

wherein the co-additive is present in a molar ratio of 5%-120% relative to chloride of the chloride source in the first-stage reaction mixture.

2. The process of claim 1 wherein the first stage reaction mixture comprises about less than 1.2% (w/w) of the silver content relative to the total weight of the first-stage reaction mixture.

3. The process of claim 1 wherein the co-additive is at a molar ratio of about 0.2-7% (mol/mol) of the silver content in the first-stage reaction mixture.

4. The process of claim 1 wherein the chloride is at a molar ratio of 1-20% (mol/mol) to the silver content in the first-stage reaction mixture.

5. The process of claim 1 wherein the capping agent is at a molar ratio of 100-1000% (mol/mol) to the silver content in the first-stage reaction mixture.

6. The process of claim 1 wherein at least 90% of the silver content has converted to the silver nanowires before the second portion of the silver salt is added.

7. The process of claim 1 wherein the first portion of the silver salt and the second portion of the silver salt together are about 0.01-10% w/w of the total reaction mixture.

8. The process of claim 1 wherein the co-additive is a tetrafluoroborate salt, a substituted phenol, or a trialkylamine.

9. The process of claim 8 wherein the co-additive is sodium tetrafluoroborate, catechol, or tributylamine.

10. The process of claim 1 wherein the chloride source is a quaternary ammonium chloride.

11. The process of claim 1 wherein the capping agent is polyvinyl pyrrolidone.

12. The process of claim 1 further comprising purifying the silver nanowires, wherein the purifying process comprises:

providing a crude product of silver nanostructures in the polyol solvent, the crude product comprising silver nanowires,

allowing the silver nanowires to settle to provide a supernatant comprising low aspect ratio nanostructure; and

removing the supernatant comprising low aspect ratio nanostructures.

13. The process of claim 1 further comprising purifying the silver nanowires, wherein the purifying process comprises:

(a) providing a crude product having silver nanowires suspended in a polyol solvent, the crude product further comprising the capping agent;

(b) adding a solvent to the crude product, wherein the capping agent has a solubility in said solvent of less than 5% w/w;

(c) allowing the silver nanowires to sediment to provide a supernatant comprising low aspect ratio nanostructures; and

(d) isolating the sedimented silver nanowires from the supernatant.