partment **116**. As described above, suitable substitutes for ethanol may be selected, such as isopropyl alcohol, methanol, and acetonitrile.

[0094] It should be understood that either of the first or second "sub-steps" of dialysis stage **16** may be excluded. For example, in the embodiment illustrated in FIG. **1**B in which colloidal electrophoresis is not practiced, a buffer such as tris-glycine is never introduced into the process. Accordingly, the first "sub-step" of stage **16** may be omitted. (As noted above, colloidal electrophoresis stage **14** optionally may omit a buffer.)

[0095] It should be understood that various modifications and alterations to the exemplary embodiments described above are possible and within the purview of a person skilled in the art having reference to this disclosure. For example, agitation spheres may be added to compartment **116** of the dialysis apparatus **100**. Rotational movement of the dialysis apparatus **100** causes the agitation spheres to impact the membranes of cassettes **110**, **112**, imparting a self-cleaning action to reduce or prevent membrane blockage. The agitation spheres are preferably inert with the system. The agitation spheres may be made of acetal, as sold under the trade name Delrin by DuPont. The agitation spheres also may be employed in other stages, such as electrophoresis stage **14**. Advantageously, the embodied apparatus and methods of the present invention may be practiced to severe and isolate carbon nanotubes from their metallic catalysts and bundles without requiring chemical or thermal treatment. The destruction of carbon nanotubes is significantly reduced compared to existing processes. Also advantageously, the processes embodied herein are easily scaled up for industrial processing, and do not produce toxic waste products.

[0096] Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details, representative devices and methods, and illustrative examples shown and described. Accordingly, departures may be made from such details without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

What is claimed is:

1. A method of harvesting carbon nanotubes, comprising:
agitating carbon nanotubes associated with metallic catalysts and having amorphous carbon coatings in an aqueous liquid containing a dispersant and substantially free-flowing grit particles to disassociate the carbon nanotubes from the metallic catalysts, at least partially remove amorphous carbon of the amorphous carbon coatings, and shorten the carbon nanotubes via shearing.

2. The method of claim **1**, wherein said agitating comprises rotating the aqueous liquid containing the carbon nanotubes in a tumbler in the presence of the substantially free-flowing grit particles.

3. The method of claim **2**, wherein the grit particles comprise diamond.

4. The method of claim **2**, wherein the grit particles comprises silicon carbide.

5. The method of claim **2**, wherein the dispersant coats the grit particles and the carbon nanotubes.

6. The method of claim **2**, wherein the dispersant is anionic.

7. The method of claim **6**, wherein the disperant comprises sodium dodecyl sulfate.

8. The method of claim **2**, wherein the tumbler comprises at least one mesh and a magnet, and wherein the method further comprises, concurrently with said rotating, steps of:
applying a magnetic force to attract the metallic catalysts towards the magnet; and
filtering the sheared carbon nanotubes through the mesh to substantially separate the sheared carbon nanotubes from the grit particles.

9. The method of claim **8**, further comprising generating a generally axial flow of the aqueous liquid in the tumbler in a direction away from the magnet.

10. The method of claim **2**, further comprising subjecting the aqueous liquid containing the carbon nanotubes, the metallic nanoparticles, and the amorphous carbon of the amorphous carbon coatings to a magnetic phase separation stage in which stratified layers of the carbon nanotubes, the amorphous carbon, and the metallic catalysts are developed for separation.

11. The method of claim **10**, wherein the magnetic phase separation stage comprises adding glycerol to the aqueous liquid.

12. The method of claim **10**, further comprising freezing the aqueous liquid and the stratified layers, and separating the stratified layers from one another.

13. The method of claim **2**, further subjecting the aqueous liquid containing the carbon nanotubes to an electrophoresis stage.

14. The method of claim **13**, wherein the electrophoresis stage is carried out in a rotating vessel comprising at least one rotating membrane for filtering the carbon nanotubes from the amorphous carbon.

15. The method of claim **2**, further comprising:
subjecting the aqueous liquid containing the carbon nanotubes, the metallic catalysts, and the amorphous carbon of the amorphous carbon coatings to a magnetic phase separation stage in which stratified layers of the carbon nanotubes, the amorphous carbon, and the metallic catalysts are developed for separation; and
subjecting a stratified layer containing the carbon nanotubes to an electrophoresis stage in a rotating vessel comprising at least one rotating membrane for filtering the carbon nanotubes from the amorphous carbon.

16. The method of claim **15**, wherein:
the electrophoresis stage comprises combining the carbon nanotubes with a buffer, and
the method further comprises a dialysis stage for separating the buffer from the carbon nanotubes.

17. The method of claim **15**, further comprising a dialysis stage for separating the carbon nanotubes from the dispersant.

18. The method of claim **17**, wherein the dispersant comprises sodium dodecyl sulfate.

19. A method of harvesting carbon nanotubes, comprising:
subjecting carbon nanotubes, metallic catalysts and amorphous carbon to a density gradient, magnetic phase separation in which stratified, resolved layers of the carbon nanotubes, the amorphous carbon, and the metallic catalysts are generated to allow for separation.

20. A method of harvesting carbon nanotubes, comprising:
subjecting a liquid containing a dispersant, carbon nanotubes, and amorphous carbon to an electrophoresis operation in a rotating apparatus containing at least one rotating membrane sized to permit the passage of the amorphous carbon, but to intercept and block the passage of the carbon nanotubes.

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