WHAT IS CLAIMED IS:

1. A method of making a marked paper product, the method comprising irradiating a paper product under conditions selected to alter the functionalization of at least an area of the paper product.

2. The method of claim 1 wherein the paper is irradiated with ionizing radiation.

3. The method of claim 1 wherein the dose of ionizing radiation is at least 0.10 MRad.

4. The method of claim 1 wherein the dose of ionizing radiation is at least 0.25 MRad.

5. The method of claim 1 wherein irradiating comprises irradiating with gamma radiation, and/or with electron beam radiation.

6. The method of claim 5 wherein the electron beam has an energy of at least 0.25 MeV.

7. The method of claim 1 wherein irradiating is performed under conditions selected to increase the number of carboxylic acid groups present in the paper product.

8. The method of claim 1 further comprising quenching the treated paper product.

9. The method of claim 8 wherein quenching is performed in the presence of a gas selected to react with radicals present in the irradiated paper product.

10. The method of claim 1 wherein only a portion of the paper product is irradiated.

11. The method of claim 8 wherein only a portion of the paper product is quenched.

12. A marked paper product comprising a cellulosic or lignocellulosic fibrous material containing functional groups not present in a naturally occurring cellulosic or lignocellulosic fibrous material from which the paper product was obtained.

13. The marked paper product wherein the cellulosic or lignocellulosic fibrous material in the marked paper contains a greater number of carboxylic acid groups than are present in the naturally occurring cellulosic or lignocellulosic fibrous material.

14. The marked paper product of claim 12 wherein the cellulosic or lignocellulosic fibrous material in the marked paper includes functional groups selected from the group consisting of aldehyde groups, nitroso groups, nitrile groups, nitro groups, ketone groups, amino groups, alkyl amino groups, alkyl groups, chloroalkyl groups, chlorofluoroalkyl groups, and enol groups.

15. The marked paper product of claim 12 wherein the cellulosic or lignocellulosic fibrous material in the marked paper includes a plurality of saccharide units arranged in a molecular chain, and from about 1 out of every 5 to about 1 out of every 1500 saccharide units comprises a nitroso, nitro, or nitrile group.

16. The marked paper product of claim 12 wherein the cellulosic or lignocellulosic fibrous material in the marked paper comprises a mixture of nitrile groups and carboxylic acid groups.

17. The marked paper product of claim 15 wherein the saccharide units include substantially only a single type of group, such as a carboxylic acid group, a nitrile group, a nitroso group or a nitro group.

18. The marked paper product of claim 12 wherein the cellulosic or lignocellulosic material in the paper product is selected from the group consisting of fiber derived from wood, fiber derived from recycled paper, cotton, hemp, linen, rice, sugarcane, bagasse, straw, bamboo, kenaf, jute, and flax, and mixtures thereof.

19. A method of identifying whether a paper product is marked, the method comprising

comparing the functionalization of a sample paper product to the functionalization of a marked paper product.

20. The method of claim 19 further comprising determining the functionalization of the sample paper product using a technique selected from the group consisting of AFM, CFM, ESR and IR.

21. The method of claim 19 wherein comparing comprises comparing the number of carboxylic acid groups present in the sample paper product with the number of carboxylic acid groups present in the marked paper product.

CLAIMS

1. A method of making a marked paper product, the method comprising

irradiating only a discrete portion of a paper product with at least 0.10 MRad of electron beam radiation, under conditions selected to alter the functionalization of the portion of the paper product so as to mark the paper product.

2. The method of claim 1 wherein the discrete portion of the paper product is irradiated with ionizing radiation.

3. The method of claim 1 wherein the dose of ionizing radiation is at least 0.25 Mrad.

4. The method of claim 1 wherein the electron beam has an energy of at least 0.25 MeV.

5. The method of claim 1 wherein irradiating is performed under conditions selected to increase the number of carboxylic acid groups present in the irradiated portion of the paper product.

6. The method of claim 1 wherein irradiating generates free radicals in the irradiated portion of the paper product and the method further includes quenching the free radicals to produce a quenched paper product.

7. The method of claim 6 wherein quenching is performed in the presence of a gas selected to react with radicals present in the irradiated paper product and the gas reacts with the radicals.

8. The method of claim 1 further comprising masking the remainder of the paper product, other than the discrete portion, with a radiopaque material.

9. The method of claim 1 wherein the discrete portion is in the form of a watermark or symbol.