carrier to produce a composition that scatters radiation in a wavelength band in substantially all directions.

[0006] The present invention further includes a composite radiation reflecting and absorbing composition, comprising a plurality of colloidal crystals, each crystal comprising radiation reflecting particles arranged in a colloidal array and radiation absorbing particles dispersed in the crystals. The composition scatters radiation in a wavelength band in substantially all directions and absorbs radiation in another wavelength band.

[0007] Also included is a method of producing a composite radiation reflecting and absorbing composition comprising: producing a dispersion comprising charged mondispersed first particles and second radiation absorbing particles; arranging the first particles into periodic arrays in which the second particles are randomly distributed, wherein each crystal scatters radiation by reflection from the first particles and absorbs radiation by the second particles; and dispersing the crystals in a carrier to produce a composition that scatters radiation in a wavelength band in substantially all directions and absorbs radiation in another wavelength band.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Fig. 1 is a transmission electron microscope (TEM) image of hollow particles produced according to one embodiment of the present invention;

[0009] Fig. 2 is a TEM image of hollow particles produced according to another embodiment of the present invention;

[0010] Fig. 3 is a TEM image of hollow particles produced according to another embodiment of the present invention;

[0011] Fig. 4 is an image in black and white of a set of colored images of the hollow particles show in Figs. 1-3 drawn down and overcoated with a UV coating, appearing red, green and blue, from left to right;

[0012] Fig. 5 is a scanning electron microscope (SEM) image of crystal aggregates produced according to one embodiment of the present invention;

[0013] Fig. 6 is an image of an off-white coating composition produced according to the present invention;

[0014] Fig. 7 is a TEM image of hollow particles produced according to another embodiment of the present invention; and

[0015] Fig. 8 ~~includes~~is a black and white image of colored images of sprayed dried crystal aggregates coated onto an opacity chart, without nanoparticles (Fig. 8A) and with nanoparticles (Fig. 8B).