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DIRECT METHOD FOR METALIZATION OF CAST-COATED PAPER

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This invention relates to a method for metalization of cast-coated paper products.

The prime object of our invention is to apply to cast-coated paper and paperboard a metallic layer, or coating, derived from the vapor deposition of the metal, in such a manner as to produce the brilliant, metallic appearance corresponding to that of the foil of the metal.

It is our further object to achieve this metalization by a direct method, that is, by having the cast-coated paper pass through a high-vacuum metalization chamber, whereby the vaporized metal is deposited directly upon the cast-coated material.

The term "paper," as used herein, includes sheets made from natural and synthetic cellulosic fibrous materials, as well as the natural and synthetic nitrogen-containing fibrous materials (including those made from polyamides, caprolactam, acrylics and modified acrylics).

The fact that metallic vapors may be deposited upon paper is known. However, present methods of direct metalization are accompanied by at least three critical disadvantages. Firstly, resultant metallic films of the more useful metals such as aluminum often have a dull-grey color instead of the brilliant, metallic appearance corresponding to that of the foil of the metal. Secondly, resultant films are porous, permeable to gases including water vapor, and do not serve as barriers as do the foils of the metals. Thirdly, paper and paper board must be "degassed" before they are passed into the high-vacuum metalization chamber (by degassing is meant the releasing of occluded and absorbed gases including water vapor which are characteristically picked up by paper and paper board under ambient conditions). Unless this "degassing" is done, these occluded and absorbed gases including water vapor will be released from the paper board in the high vacuum chamber, thereby deteriorating the high vacuum and, simultaneously, providing an atmosphere of molecules which emanate from the surface of the paper material and which tend to deflect or slow down the vaporized-metal particles. This results in a damaged, inferior, metallic coating.

It is another object of our invention to cast-coat paper and paper board with aqueous dispersions of a particular class of high polymers under conditions producing a cast-coat free of "out-gassing" solvents thereby permitting the production of a continuous, smooth, highly-polished metallic film without the customary "degassing" step.

We have found that in order for the metalized paper to have the proper brilliance and uniformity, it is advisable that the paper or paper board, before metalization, have a hard surface with high gloss, maximum smoothness, good adhesion for the metal and not "outgas."

Methods for producing smooth, high-gloss coatings on paper are well known in the art. One such method comprises coating paper with a binder-filler composition, drying, and then passing the thus-coated material over calendering rolls to produce a polished surface. However, the coated paper usually lacks sufficient smoothness and gloss to produce the brilliant metallic appearance corresponding to the foil of the metal. Further, the average coating composition when exposed to the heat and high-vacuum conditions of the metalization chamber usually undergoes decomposition of at least some of its components. This shows itself as "outgassing"—that is, the formation of gases within the coating which, in turn, results in a discontinuous, blemished or dull, metalized coating.

In another method, binder-filler compositions as noted above, are followed with a second coat (or top coat as these terms will be used interchangeably) of a lacquer. This results in some improvement in the gloss, but has added appreciably to the complexity of the operation. These organic-solvent solutions of high polymers are ordinarily toxic and flammable, consequently their use entails added precautions and danger. Further, because of the flammability of the lacquers, usual cast-coating machines which operate at elevated temperatures cannot be used; it is difficult to dry out all the solvent used in formulating the lacquer solution, particularly the high-boiling portion, and this residue adds to the problem of "outgassing" discussed above. Higher drying temperatures to decrease the retained solvent (and reduce the outgassing) merely increase the fire hazards associated with the operation. Also, of course, these organic solvents are expensive.

In spite of the importance of metalized paper and paper board in the protective-packaging, reflective-insulation and decorative-packaging fields, there has heretofore been no practical method by which commercially acceptable, cast-coated, metalized-paper products having a brilliance corresponding to that of the foil of the metal could be produced by direct metalization. This problem has been particularly aggravating with respect to "outgassing."

We have now discovered that smooth, high-gloss brilliant metalized surfaces may be obtained upon paper and paper board by direct metalization without "outgassing," provided that the paper is first cast coated with an aqueous dispersion (or emulsion, the terms being used interchangeably) of a resinous composition of a specified type.

We have further found that this aqueous emulsion ("dispersion" and "emulsion" being herein used interchangeably) to be cast-coated onto paper and paper board must be selected from certain high polymers that do not form films at ordinary temperatures but do form films at certain elevated temperatures, said films having certain critical properties of hardness, gloss, blocking, metal adhesion and plastic flow.

The reason for the notable superiority of the above high-polymer compositions, for the purposes of this invention, is not entirely known. It may be that it results from the extreme hardness of the surface which these high polymers form upon the paper, as well as their high gloss. Whatever the reason, however, we have found that when paper is first cast-coated with these resins, and the thus coated paper is then passed through a vacuum metalization chamber, a brilliant metallic film is obtained by direct metalization. Of extreme importance is the fact that no perceptible "outgassing" occurs.

DESCRIPTION OF THE INVENTION

In general terms the cast-coating process of this invention may be simply described. Paper, or paper board, preferably having a weight basis of at least 50 pounds per ream (3,000 square feet) in continuous form is coated under ambient conditions with an aqueous dispersion of the polymer, or copolymers, described below, employing any one of the well-known coating procedures, including air knife, reverse roll, or direct roll with a wire employing any one of the well-known coating procedures wound smoothing (Meyer) bar. The wet-coated paper is then dried with the coated surface in contact with a casting drum (a highly-polished metallic drum—usually chrome plated or stainless steel) at a temperature of about 160–210° F., preferably 190 to 210° F. The smooth surface required on the finished cast-coated paper

products is, in part, controlled by the temperature of the casting drum, and we have found that the above temperatures cause excellent results to be obtained. The dry, cast-coated paper is then passed through the metalization chamber, where it is coated with metal by a conventional high-vacuum metallic vapor deposition process. The above process will be designated in this invention as a one-step process.

For paper and paper board having a basis weight lower than about 50 pounds per ream, it is desirable to apply a preliminary or "base" coat of a binder-filler composition, employing any of the base-coating procedures known to those skilled in the art. The base coat is then dried and, if desired, polished as by a friction calender. The "base-coated" paper or paper board is then "cast-coated" as described above in the "one step process" after which it is passed through the metalization chamber where it is coated with a metal by the direct-metalization process. This method will be designated in this invention as a two-step-method.

When a "base coat" is desired, various types of binder-filler combinations may be employed. In one type, the binder may be any suitable resin, such as vinyl acetate-ethyl acrylate copolymers, methyl methacrylate-ethyl acrylate copolymers, butadiene-styrene copolymers, and the like; the filler may be inorganic such as clay and the like. In another type, excellent results have been obtained when part of the resin binder has been replaced by starch, or modified starch, say of the order of about 10 to 30% of the total weight of the binder, the filler comprising inorganic pigments as noted above. In still another type, the starch is replaced with certain hydrocolloids including methyl cellulose, carboxymethyl cellulose, hydroxyethyl cellulose and the like.

When starch or a hydrocolloid is to be incorporated into the binder-filler composition, it should be admixed with the filler in aqueous suspension, after which the pH is adjusted to about 7–8. The resin is then added and the pH finally adjusted with ammonia to about 8–9.

It is an advantage of our process that the cast-coated films show no tendency to "out gas" in the high-vacuum, metalization chamber.

It is a further advantage that the cast-coated film is continuous (free of out-gassing holes), smooth, clear, and hard and is easily metalized by a direct metalization procedure.

It is a still further advantage of our process that paper or paper board cast coated in the above described manner and subsequently metalized by a direct metalization procedure has a brilliant, metallic appearance corresponding to that of the foil of the metal.

In applying the coating to be cast, either of two procedures may be used. In the first, the aqueous dispersion of high polymers is applied to the paper by any conventional method as noted above after which the wet paper is brought into contact with the casting drum and dried. This may be termed the "direct method."

In another process, the coating is applied to the casting drum by conventional methods, such as spraying or offset, and, before the coating has dried the dry paper or paper board is brought into contact with the wet film which is absorbed by the paper and stripped from the drum. This may be termed the "indirect method." Both of these methods are known to those skilled in the art and do not necessarily form a part of this invention.

TYPE OF POLYMERS EMPLOYED

The cast-coating compositions used in our invention must be of a type which produce fused films having specific properties of hardness, gloss, "Tg" and block, which will be described more fully below. The compositions comprise adequate dispersions of selected polymers and copolymers which do not form films at ordinary temperatures.

The suitable polymers are those which form hard, glossy, non-blocking, continuous films when cast from their aqueous dispersions and fused at temperatures in the order of about 160 to 210° F. Such polymers (which for the sake of convenience we shall refer to as "base polymers") include polymerized styrene, vinyl chloride, vinylidene chloride, methyl methacrylate, vinyl acetate and the like. (The monomers themselves, i.e. styrene, vinyl chloride, etc., will be called "base monomers".) The polymers may be in the form of homopolymers, or the base monomers may be copolymerized with one another (e.g. polyvinyl chloride-acetate). The base monomers may also be copolymerized with certain other monomers which impart desired properties to the copolymer. Thus, the base monomers may be copolymerized with monomers which impart a plasticizing effect to the resultant copolymer, such plasticizing monomers including the acrylic esters, such for example as ethyl acrylate, butyl acrylate, octyl acrylate and the like, as well as the corresponding maleates and fumarates. The base monomers may also be copolymerized with polar monomers which impart to the ultimate fused film hardness and adhesive affinity for metals. Such polar monomers include crotonic acid, fumaric acid, itaconic acid, maleic acid, acrylic acid, methacrylic acid and hydroxyethyl acrylate.

In the copolymers described above, the base monomer should ordinarily constitute at least 70% by weight of the copolymer solids; conversely, the plasticizing and polar monomers should not constitute more than about 30% of the copolymer solids.

As an additional component of the composition, there may be present, if desired, a small amount of a very soft polymer such as the polymers of vinyl propionate, vinyl stearate, vinyl benzoate or vinyl butyrate. These may be present as homopolymers, or in the form of copolymers with the base monomers previously described. These "soft polymers" act to soften the composition, and since the object of the invention is to attain an ultimate film that is hard, it is seen that these soft polymers, when employed, must be present in minor amounts, ordinarily not greater than 5% of the total polymer solids.

FORMATION OF THE DISPERSIONS FOR CAST-COATING

Homopolymers may be made by polymerizing the base monomers, or copolymers may be made by copolymerizing the base monomers with one or more of the modifying substances described above, using conventional polymerization methods to form aqueous polymer or copolymer dispersions (i.e. emulsions or latices). Emulsion polymerization is preferred. Regardless of the polymerization method used, or of the particular polymer, copolymer, or admixture of resins present in the aqueous dispersion, such dispersions are suitable for use in our invention only if they are capable of forming films, by cast-coating upon paper or paperboard, possessing the following properties:

(*a*) A Sword Rocker Hardness of about 24 to 46
(*b*) A "Tg" of about 32° to 200° F.
(*c*) A gloss of about 52 to 82
(*d*) A blocking temperature of about 190° to 210° F.

Sward Rocker Hardness (hereafter referred to as SRH) may be defined as the hardness of the film as compared to the hardness of glass, as determined on the Sward Hardness Rocker (a widely employed apparatus). A description and procedure for this test is found in the book "Lacquer and Synthetic Finishes," by Martin, D. Van Nostrand and Co., New York, 1940, page 259.

("Tg" refers to the second order transition temperature of a substance, and is determined by refractive index methods. The test is described in an article by Wiley in the Journal of Polymer Science, 2, 10 (1947).

Gloss is the ratio of reflected light to incident light at

an angle of 60°, as determined by American Society of Testing Materials Method No. D 1455–56 T (1956).

Block (or blocking temperature) is the temperature at which adhesion occurs between touching layers of the film, under slight pressure, and is tested by American Society of Testing Materials Method No. D 884–48 (1948).

The embodiment of our invention will be further illustrated by the following examples. Unless otherwise specified, all parts are by weight.

Example I

We prepared four aqueous emulsions by emulsion copolymerizing each of the following combinations of monomers:

"A" 25 parts methyl methacrylate and 75 parts vinyl acetate

"B" 35 parts methyl methacrylate and 65 parts vinyl acetate

"C" 50 parts methyl methacrylate and 50 parts vinyl acetate

"D" 70 parts methyl methacrylate and 30 parts vinyl acetate

The concentration of copolymer solids in each of the emulsions was between 43% and 50%.

The four compositions were then tested for hardness and second order transition temperatures by the procedures previously noted. The results are summarized below, as are those of the other tests performed in connection with this example.

In all of these examples we employed a roll of supercalendered northern kraft paper having a basis weight of about 50 pounds per ream. Six pieces of this paper were coated with composition "A" by the direct method, to give a coating weight of about 1.5 to 3.0 lbs. polymer solids per 1000 sq. ft. of paper, after which one piece was cast-coated at 160° F., one piece at 180° F., one at 190° F., one at 200° F., and the last at 210° F.

The six cast-coated films were then tested for gloss, using the previously mentioned reflected-light method. The temperature of "block" was also noted during the cast coating of the films.

Compositions "B," "C" and "D" were similarly cast-coated upon pieces of the paper, and tested as indicated above.

The test results follows

Composition	Tg, ° F.	SRH	Gloss at Cast-Coating Temperatures of—					
			160° F.	170° F.	180° F.	190° F.	200° F.	210° F.
"A"	118	40	66	68	70	64	Block	Block
"B"	133	42	64	66	71	61	75	Block
"C"	153	42	64	68	73	64	69	60
"D"	180	42	64	64	70	61	69	65

When the cast-coated papers were passed through a high-vacuum metalization chamber, and aluminum was vapor-deposited thereon, a brilliant, continuous, metallic surface was produced, comparable to the foil of the metal in appearance, and with no evidence of outgassing.

Example II

We prepared aqueous emulsions by emulsion copolymerizing each of the following combinations of monomers:

"E" 70 parts methyl methacrylate and 30 parts ethyl acrylate

"F" 80 parts methyl methacrylate and 20 parts ethyl acrylate

"G" 90 parts methyl methacrylate and 10 parts ethyl acrylate

The concentration of copolymer solids in each of the emulsions was between 40% and 45% by weight.

The compositions were tested for hardness and second order transition temperature as in Example I.

Each of the above compositions was coated upon three separate pieces of paper (from the same roll used in Example I), so that there were nine pieces in all. In the case of each composition, one paper was cast-coated at 160° F., another at 180° F. and the third at 200° F. The thus coated papers were then tested for gloss and block as in Example I.

Composition	Tg, ° F.	SRH	Gloss at Cast-Coating Temperatures of—		
			160° F.	180° F.	200° F.
"E"	133	24	63	72	61
"F"	174	28	52	62	57
"G"	198	36	52	53	57

When the cast-coated papers were passed through a high-vacuum metallization chamber, and aluminum metal vapor-deposited thereon, there resulted a brilliant, continuous metallic surface upon the paper, comparable to the metal foil.

Example III

This example illustrates the use of aqueous dispersions of terpolymers, two of the monomers comprising said terpolymers being the "base monomers" referred to earlier.

By conventional emulsion polymerization procedures, we copolymerized each of the following combinations of monomers:

"H" 60 parts methyl methacrylate, 24 parts vinyl acetate, 16 parts ethyl acrylate

"I" 70 parts methyl methacrylate, 18 parts vinyl acetate, 12 parts ethyl acrylate

"J" 80 parts methyl methacrylate, 12 parts vinyl acetate, 8 parts ethyl acrylate

"K" 90 parts methyl methacrylate, 6 parts vinyl acetate, 4 parts ethyl acrylate

The concentration of resin solids in each of the emulsions was between 40 and 47% by weight.

The compositions were tested for hardness and second order transition temperature as in Example I. Each of the compositions was cast-coated upon paper at 160° F., 180° F. and 200° F., as in the previous example. Gloss and block were then determined.

Composition	Tg, ° F.	SRH	Gloss at Cast-Coating Temperatures of—		
			160° F.	180° F.	200° F.
"H"	150	32	62	68	66
"I"	169	36	52	62	56
"J"	188	38	52	62	55
"K"	203	40	52	53	54

When metallic vapors were deposited upon the cast-coated papers, in a high vacuum metalization chamber, there was no evidence of outgassing, and brilliant, metallic surfaces were produced, corresponding to the foil of the metal.

Example IV

This example illustrates the use of dispersions comprising mixtures of two separate homopolymers.

We prepared four dispersions, by mixing together aqueous dispersions of polymethyl methacrylate and polyvinyl acetate in the following proportions:

"L" 25 parts polymethyl methacrylate and 75 parts polyvinyl acetate

"M" 35 parts polymethyl methacrylate and 65 parts polyvinyl acetate

"N" 50 parts polymethyl methacrylate and 50 parts polyvinyl acetate

"O" 70 parts polymethyl methacrylate and 30 parts polyvinyl acetate

The concentration of resin solids in the blended dispersions was between 45% and 55% by weight.

The compositions were tested for hardness and for second order transition temperature as in Example I. Each of the compositions was then cast-coated by the previously described indirect method upon three pieces of paper, at 160° F., 170° F., 180° F., 190° F., 200° F., and 210° F., respectively. The cast-coated films were then tested for gloss and block.

Composition	Tg, ° F.	SHR	Gloss at Cast-Coating Temperatures of—					
			160° F.	170° F.	180° F.	190° F.	200° F.	210° F.
"L"	80	40	68	70	73	70	Block	Block
"M"	95	40	66	67	72	72	75	Block
"N"	104	40	65	67	74	73	70	69
"O"	180	42	62	63	70	74	73	73

When metallic vapors were deposited upon the cast-coated sheets, in a high-vacuum vapor metalization chamber, there resulted brilliant, metallic surfaces, with no evidence of outgassing.

Example V

In this example, aqueous dispersions of the homopolymers were blended in the following proportions:

"P" 70 parts polymethyl methacrylate and 30 parts polyethyl acrylate
"Q" 80 parts polymethyl methacrylate and 20 parts polyethyl acrylate
"R" 90 parts polymethyl methacrylate and 10 parts polyethyl acrylate

The blended dispersions contained between 40% and 47% resin solids, by weight.

The three compositions were tested for gloss and second order transition temperature, as in the other examples. They were cast-coated upon paper at temperatures of 160° F., 180° F., and 200° F. respectively. The direct method of coating was employed.

Composition	Tg, ° F.	SRH	Gloss at Cast-Coating Temperatures of—		
			160° F.	180° F.	200° F.
"P"	180	44	65	73	68
"Q"	180	44	58	69	72
"R"	180	46	55	57	70

When metallic vapors were deposited upon the cast-coated sheets, in a high-vacuum metalization chamber, brilliant metallic coatings were produced, corresponding to the brilliance and uniformity of the metal foil.

Example VI

We blended aqueous dispersions of homopolymers in the following proportions:

"S" 60 parts polymethyl methacrylate, 24 parts polyvinyl acetate, 16 parts polyethyl acrylate
"T" 70 parts polymethyl methacrylate, 18 parts polyvinyl acetate, 12 parts polyethyl acrylate
"U" 80 parts polymethyl methacrylate, 12 parts polyvinyl acetate, 8 parts polyethyl acrylate
"V" 90 parts polymethyl methacrylate, 6 parts polyvinyl acetate, 4 parts polyethyl acrylate

The blended dispersions contained between 35% and 40% solids, by weight.

As in the previous example, the compositions were tested for hardness and second order transition temperatures, and cast-coated upon paper.

Composition	Tg, ° F.	SRH	Gloss at Cast-Coating Temperatures of—		
			160° F.	180° F.	200° F.
"S"	180	35	71	82	70
"T"	180	42	68	82	70
"U"	180	44	62	68	67
"V"	180	46	62	60	62

A word of explanation is indicated with regard to the figures for "Tg" in the above blends. Tg depends to some extent upon the particle size of the dispersion. In a blend of individual polymers, in which the different components are physically admixed, the Tg of the blend is difficult to determine, but it is less than that of the component which has the highest transition temperature. In the above blends, polymethyl methacrylate, the major component, has the highest transition temperature (about 180° F.), and this value has been listed, although the Tg of the blend will be somewhat lower.

When metallic vapor was deposited upon the cast-coated sheets, as in the previous examples, in a high-vacuum metalization chamber, a brilliant metallic surface resulted, with no evidence of outgassing.

Example VII

This example illustrates the use of a base coat on paper, prior to application of the cast coat. As previously explained, such a preliminary base coat is often desirable when using a low basis weight paper.

Chemical-pulp paper stock having a basis weight of about 40 pounds per ream (3000 sq. ft.) was given a base coating consisting of:

80 parts clay
20 parts titanium dioxide } in predispersed form
0.2 part sodium hydroxide
14. parts oxidized starch, medium-low viscosity
2 parts vinyl acetate-ethyl acrylate copolymer
0.4 part calcium stearate
Water to 50% solids

The coating was applied, to give about 7.5 lbs. per ream, using conventional "on machine" methods.

The dry, base-coated paper was then cast-coated at about 200° F. with composition "C" of Example I, at a coating weight of about 6 lbs. per ream. The resultant cast-coated paper was very smooth, with good gloss, and when metalized by a metallic vapor, achieved a metallic appearance corresponding to that of the metal foil.

Substitution of the other named resin dispersions, such as "F," "J" or "T," in place of "C," also gave excellent cast coated papers and ultimate metallized surfaces.

It will be understood that the base coat need by no means be limited to the above-described composition. The practitioner will be able to formulate such base coatings, based on known art, to meet his particular needs. Thus, for example, the starch may be replaced by other binders, such as dextrine, methyl cellulose, hydroxy ethyl cellulose, and the like. Various resinous binders are also suitable. Dispersing agents such as hexametaphosphate are sometimes added to such coating compositions.

After the paper has received the cast coating (with or without a preliminary base coat), and after it has been metallized, it is possible to apply a coat of transparent lacquer over the metalized surface. This tends to protect the metalized surface against abrasion. If a dye is added to the lacquer, interesting decorative coloring effects are obtained.

Attempts have been made, in the past, to metalize paper which had been cast-coated with a pigmented coating, ordinarily with a proteinaceous binder. Such pigmented cast-coating compositions were employed because of the common assumption that resinous high polymers, being

ordinarily thermoplastic, could not be used in cast coating, since they would stick to the hot, smooth surfaces which are an integral part of the cast-coating apparatus. It was our discovery that certain selected high polymeric resins, having the hereinabove described characteristics of hardness and second order transition temperature, could indeed be used to cast-coat paper, which made possible the application of a clear, hard, glossy, resinous film upon paper, which in turn made possible the highly successful subsequent metalization step.

Although we have herein illustrated the use, as cast-coating compositions of several specific polymers, copolymers, and mixtures of polymers, it is to be emphasized that a great latitude is available to the practitioner in varying the materials and proportions of the cast-coating resins. Regardless of the particular resin employed, which is entirely a matter of individual convenience and choice, the essence of this invention lies in the discovery that the cast-coating resin (and the film formed therefrom) must meet the herein described criteria of hardness, second-order transition temperature, gloss and block. If these criteria are met, the subsequent metalization of the cast-coated paper will be successful.

We claim:

1. The process of producing a metallic surface upon paper which comprises the step of cast-coating on paper an aqueous dispersion of a resin polymer, the particles of which resin polymer remain dispersed at ambient temperatures but which are capable of fusing to form a continuous film at higher temperatures, and subjecting said dispersion in the cast-coating step to a temperature within the range of 160° F. to 210° F. and thereby forming a hard glossy resin polymer film having a Sward Rocker Hardness value within the approximate range 24 to 46, a second order transition temperature within the approximate range 32° F. to 200° F., a gloss value within the approximate range 52–82, and a blocking temperature within the approximate range 190° F.–210° F., and then passing said cast-coated paper through a high vacuum metalization chamber wherein vaporized metal is deposited on the resin polymer film, said resin polymer being selected from the class consisting of polystyrene, polyvinyl chloride, polyvinylidene chloride, polymethyl methacrylate, polyvinyl acetate and mixtures thereof and copolymers of at least one monomer selected from the class consisting of styrene, vinyl chloride, vinylidene chloride, methyl methacrylate and vinyl acetate and at least one other monomer selected from the class consisting of acrylic, maleic and fumaric esters, crotonic acid, fumaric acid, maleic acid, itaconic acid, acrylic acid, methacrylic acid and hydroxyethyl acrylate.

2. The process of producing a metallic surface upon paper which comprises the step of cast-coating on paper an aqueous dispersion of a resin polymer, the particles of which resin polymer remain dispersed at ambient temperatures but which are capable of fusing to form a continuous film at higher temperatures, drying said coated paper with the coating in contact with a highly polished metallic casting drum at a temperature within the range of 160° F. to 210° F. and thereby transforming said polymer dispersion into a hard glossy resin polymer film having a Sward Rocker Hardness value within the approximate range 24 to 46, a second order transition temperature within the approximate range 32° F. to 200° F., a gloss value within the approximate range 52–82, and a blocking temperature within the approximate range 190° F.–210° F., and then passing said cast-coated paper through a high vacuum metalization chamber wherein vaporized metal is deposited on the resin polymer film, said resin polymer being selected from the class consisting of polystyrene, polyvinyl chloride, polyvinylidene chloride, polymethyl methacrylate, polyvinyl acetate and mixtures thereof and copolymers of at least one monomer selected from the class consisting of styrene, vinyl chloride, vinylidene chloride, methyl methacrylate and vinyl acetate and at least one other monomer selected from the class consisting of acrylic, maleic and fumaric esters, crotonic acid, fumaric acid, maleic acid, itaconic acid, acrylic acid, methacrylic acid and hydroxyethyl acrylate.

3. Metalized paper comprising paper, a cast-coated polymer film upon a surface of said paper, and a vapor-deposited metallic film upon said polymer film, said polymer film having a Sward Rocker Hardness value within the approximate range 24 to 46, a second order transition temperature within the approximate range 32° F. to 200° F., a gloss value within the approximate range 52–82, and a blocking temperature within the approximate range 190° F.–210° F., the polymer in said polymer film being selected from the class consisting of polystyrene, polyvinyl chloride, polyvinylidene chloride, polymethyl methacrylate, polyvinyl acetate and mixtures thereof and copolymers of at least one monomer selected from the class consisting of styrene, vinyl chloride, vinylidene chloride, methyl methacrylate and vinyl acetate and at least one other monomer selected from the class consisting of acrylic, maleic and fumaric esters, crotonic acid, fumaric acid, maleic acid, itaconic acid, acrylic acid, methacrylic acid and hydroxyethyl acrylate.

4. Metalized paper comprising paper, a cast-coated polymer film upon a surface of said paper, and a vapor-deposited metallic film upon said polymer film, said polymer film comprising a heat-fused product of a coating of an aqueous dispersion of a resin polymer, said film having a Sward Rocker Hardness value within the approximate range 24 to 46, a second order transition temperature within the approximate range 32° F. to 200° F., a gloss value within the approximate range 52–82, and a blocking temperature within the approximate range 190° F.–210° F., said resin polymer being selected from the class consisting of polystyrene, polyvinyl chloride, polyvinylidene chloride, polymethyl methacrylate, polyvinyl acetate and mixtures thereof and copolymers of at least one monomer selected from the class consisting of styrene, vinyl chloride, vinylidene chloride, methyl methacrylate and vinyl acetate and at least one other monomer selected from the class consisting of acrylic, maleic and fumaric esters, crotonic acid, fumaric acid, maleic acid, itaconic acid, acrylic acid, methacrylic acid and hydroxyethyl acrylate.

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