

WHAT IS CLAIMED IS:

1. A plate-shaped workpiece processing method for processing a plate-shaped workpiece having a division line and a metal member formed on said division line or in an area corresponding to said division line, said plate-shaped workpiece processing method comprising:

a holding step of holding said plate-shaped workpiece on a chuck table in the condition where said metal member is exposed;

a first cutting step of cutting said plate-shaped workpiece along said division line by using a first cutting blade after performing said holding step, thereby forming a first cut groove dividing said metal member; and

a second cutting step of cutting said plate-shaped workpiece along said first cut groove by using a second cutting blade after performing said first cutting step, thereby forming a second cut groove fully cutting said plate-shaped workpiece, wherein said second cutting blade contacts said metal member during said second cutting step;

said first cutting step including the step of supplying a cutting fluid containing an organic acid and an oxidizing agent to said plate-shaped workpiece.

2. The plate-shaped workpiece processing method according to claim 1, wherein said organic acid comprises an amino acid.

3. The plate-shaped workpiece processing method according to claim 2, wherein said amino acid is an acid selected from the group consisting of glycine, dihydroxyethylglycine, glycyglycine, hydroxyethylglycine, N-methylglycine, β -alanine, L-alanine, L-2-aminobutyric acid, L-norvaline, L-valine, L-leucine, L-norleucine, L-alloisoleucine, L-isoleucine, L-phenylalanine, L-proline, sarcosine, L-ornithine, L-lysine, taurine, L-serine, L-threonine, L-allothreonine, L-homoserine, L-thyroxine, L-tyrosine, 3,5-diiodo-L-tyrosine, β -(3,4-dihydroxyphenyl)-L-alanine, 4-hydroxy-L-proline, L-cysteine, L-methionine, L-ethionine, L-lanthionine, L-cystathionine, L-cystine, L-cystic acid, L-glutamic acid, L-aspartic acid, S-(carboxymethyl)-L-cysteine, 4-aminobutyric acid, L-asparagine, L-glutamine, azaserine, L-canavanine, L-citrulline, L-arginine, δ -hydroxy-L-lysine, creatine, L-kynurenine, L-histidine, 1-methyl-L-histidine, 3-methyl-L-histidine, L-tryptophane, actinomycin C1, ergothioneine, apamin, angiotensin I, angiotensin II, and antipain.

4. The plate-shaped workpiece processing method according to claim 1, wherein said organic acid comprises an amino polyacid.

5. The plate-shaped workpiece processing method according to claim 4, wherein said amino polyacid is an acid selected from the group consisting of iminodiacetic acid, nitrilotriacetic acid, diethylenetriaminepentaacetic acid, ethylenediaminetetraacetic acid, hydroxyethyliminodiacetic acid, nitrilotrismethylenephosphonic acid, ethylenediamine-N,N,N',N'-tetramethylenesulfonic acid, 1,2-diaminopropanetetraacetic acid, glycol ether diaminetetraacetic acid, transcyclohexanediaminetetraacetic acid, ethylenediamineortho-hydroxyphenylacetic acid, ethylenediaminedisuccinic acid (SS isomer), β -alaninediacetic acid, N-(2-carboxylatoethyl)-L-aspartic acid, and N-N'-bis(2-hydroxybenzyl)ethylenediamine-N,N'-diacetic acid.

6. The plate-shaped workpiece processing method according to claim 1, wherein said oxidizing agent is selected from the group consisting of hydrogen peroxide, peroxides, nitrates, iodates, periodates, hypochlorites, chlorites, chlorates, perchlorates, persulfates, dichromates, permanganates, cerates,

vanadates, ozonated water, silver(II) salts, iron(III) salts, and their organic complex salts.

7. The plate-shaped workpiece processing method according to claim 1, wherein said oxidizing agent is selected from the group consisting of hydrogen peroxide, peroxides, nitrates, iodates, periodates, hypochlorites, chlorites, chlorates, perchlorates, persulfates, dichromates, permanganates, cerates, vanadates, silver(II) salts, iron(III) salts, and their organic complex salts.

8. The plate-shaped workpiece processing method according to claim 1, wherein said first cutting step is performed at a feed speed of 100 mm/second.

9. A plate-shaped workpiece processing method for processing a plate-shaped workpiece having a division line and a metal member formed on said division line or in an area corresponding to said division line, said plate-shaped workpiece processing method comprising:

a holding step of holding said plate-shaped workpiece on a chuck table in the condition where said metal member is exposed;

a first cutting step of cutting said plate-shaped workpiece along said division line by using a first cutting blade after performing said holding step, thereby forming a first cut groove dividing said metal member;

said first cutting step including the step of supplying a cutting fluid containing an organic acid and an oxidizing agent to said plate-shaped workpiece, and

a second cutting step of cutting said plate-shaped workpiece along said first cut groove by using a second cutting blade after performing said first cutting step, thereby forming a second cut groove fully cutting said plate-shaped workpiece, wherein said second cutting blade contacts said metal member during said second cutting step, and

wherein said second cutting blade is the same as said first cutting blade.

10. The plate-shaped workpiece processing method according to claim 9, wherein said first cutting step is performed at a feed speed of 100 mm/second.

11. A plate-shaped workpiece processing method for processing a plate-shaped workpiece having a division line and a metal

member formed on said division line or in an area corresponding to said division line, said plate-shaped workpiece processing method comprising:

a holding step of holding said plate-shaped workpiece on a chuck table in the condition where said metal member is exposed;

a first cutting step of cutting said plate-shaped workpiece along said division line by using a first cutting blade after performing said holding step, thereby forming a first cut groove dividing said metal member, wherein said first cut groove extends through said metal member at a constant width; and

a second cutting step of cutting said plate-shaped workpiece along said first cut groove by using a second cutting blade after performing said first cutting step, thereby forming a second cut groove fully cutting said plate-shaped workpiece;

said first cutting step including the step of supplying a cutting fluid containing an organic acid and an oxidizing agent to said plate-shaped workpiece,

wherein said oxidizing agent changes the film property of the metal member and said organic acid modifies the metal member to suppress its ductility, and

wherein said second cutting blade has a thickness smaller than a thickness of said first cutting blade.

12. The plate-shaped workpiece processing method according to claim 11, wherein said organic acid comprises an amino acid.

13. The plate-shaped workpiece processing method according to claim 12, wherein said amino acid is an acid selected from the group consisting of glycine, dihydroxyethylglycine, glycyglycine, hydroxyethylglycine, N-methylglycine, β -alanine, L-alanine, L-2-aminobutyric acid, L-norvaline, L-valine, L-leucine, L-norleucine, L-alloisoleucine, L-isoleucine, L-phenylalanine, L-proline, sarcosine, L-ornithine, L-lysine, taurine, L-serine, L-threonine, L-allothreonine, L-homoserine, L-thyroxine, L-tyrosine, 3,5-diiodo-L-tyrosine, β -(3,4-dihydroxyphenyl)-L-alanine, 4-hydroxy-L-proline, L-cysteine, L-methionine, L-ethionine, L-lanthionine, L-cystathionine, L-cystine, L-cystic acid, L-glutamic acid, L-aspartic acid, S-(carboxymethyl)-L-cysteine, 4-aminobutyric acid, L-asparagine, L-glutamine, azaserine, L-canavanine, L-citrulline, L-arginine, δ -hydroxy-L-lysine, creatine, L-kynurenine, L-histidine, 1-methyl-L-histidine, 3-methyl-L-histidine, L-tryptophane, actinomycin C1, ergothioneine, apamin, angiotensin I, angiotensin II, antipain, etc. Among others, particularly preferred are glycine, L-alanine, L-proline, L-histidine, L-lysine, and dihydroxyethylglycine.

14. The plate-shaped workpiece processing method according to claim 11, wherein said organic acid comprises an amino polyacid.

15. The plate-shaped workpiece processing method according to claim 14, wherein said amino polyacid is an acid selected from the group consisting of iminodiacetic acid, nitrilotriacetic acid, diethylenetriaminepentaacetic acid, ethylenediaminetetraacetic acid, hydroxyethyliminodiacetic acid, nitrilotrismethylenephosphonic acid, ethylenediamine-N,N,N',N'-tetramethylenesulfonic acid, 1,2-diaminopropanetetraacetic acid, glycol ether diaminetetraacetic acid, transcyclohexanediaminetetraacetic acid, ethylenediamineorthohydroxyphenylacetic acid, ethylenediaminedisuccinic acid (SS isomer), β -alaninediacetic acid, N-(2-carboxylatoethyl)-L-aspartic acid, and N-N'-bis(2-hydroxybenzyl)ethylenediamine-N,N'-diacetic acid.

16. The plate-shaped workpiece processing method according to claim 11, wherein said oxidizing agent is selected from the group consisting of hydrogen peroxide, peroxides, nitrates, iodates, periodates, hypochlorites, chlorites, chlorates,

perchlorates, persulfates, dichromates, permanganates, cerates, vanadates, ozonated water, silver(II) salts, iron(III) salts, and their organic complex salts.

17. The plate-shaped workpiece processing method according to claim 11, wherein said oxidizing agent is selected from the group consisting of hydrogen peroxide, peroxides, nitrates, iodates, periodates, hypochlorites, chlorites, chlorates, perchlorates, persulfates, dichromates, permanganates, cerates, vanadates, silver(II) salts, iron(III) salts, and their organic complex salts.

18. The plate-shaped workpiece processing method according to claim 11, wherein said first cutting step is performed at a feed speed of 100 mm/second.