Periodic reverse current electrodeposition of gold in an ultrasonic field using ion-track membranes as templates: Growth of gold single-crystals

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Reversal of current electrodeposition has been applied to grow gold single-crystals in organic ion-track membranes used as templates. The influence of an ultrasonic agitation of the electrolyte has been also investigated. Two electrolytes were used for gold deposition: (1) potassium dicyanoaurate(I) and (2) sodium disulfitoaurate(I) solutions. Gold single-crystals have been successfully grown only from the cyanidic solutions. The perfection of the crystals was defined by the deposition conditions, namely by the parameters of the reverse current pulses. The ultrasonic field led to a depolarization effect that favoured the growth of single-crystals when a direct current was used. Its influence on the crystal growth during pulse electrolysis was not so pronounced. However, the macrothrowing power of the bath was increased. Gold deposition from a sodium disulfite bath resulted in polycrystalline claddings independent of the variation of deposition conditions.