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(54) Title: CHALCOGENIDE-BASED MATERIALS AND METHODS OF MAKING SUCH MATERIALS UNDER VACUUM USING POST-CHALCOGENIZATION TECHNIQUES

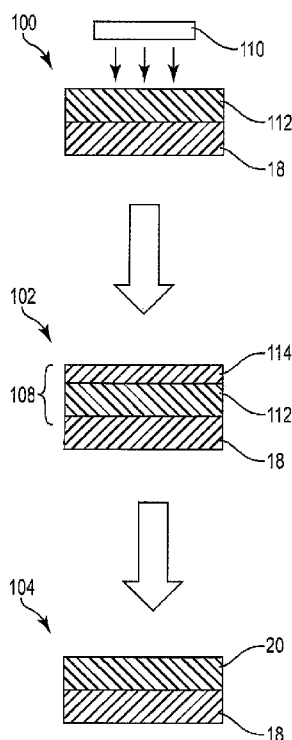


Fig. 3

(57) Abstract: The present invention provides strategies for making high quality CIGS photoabsorbing compositions on a substrate (18) from sputtered precursor film(s) (112). The precursors are converted into CIGS photoabsorbing material via a chalcogenizing treatment (also referred to as "post - chalcogenization", including, e.g., "post-selenization" when Se is used and/or "post-sulfurization" when S is used) using techniques that allow the post-chalcogenizing treatment to occur under atypically low pressure conditions. Consequently, the strategies of the invention are readily incorporated into batch processes or continuous processes such as roll-to-roll process occurring under vacuum. The present invention is useful at lab, pilot plant, and industrial scales. The precursor film (112) is capped by a second layer (114) such as elemental chalcogen using evaporation and then heat treated to form a chalcogenized layer (20).



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