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Metal nanofilm in strong ultrafast optical fields: subcycle Bloch oscillations[1] VADYM APALKOV, MARK STOCKMAN, Georgia State University — We predict theoretically that a metal nanofilm subjected to an ultrashort optical pulse of a high field amplitude ~ 3 V/Å shows semimetal behavior. At such high pulse intensity, the reflectivity of metal nanofilm is greatly reduced, while the transmissivity and the optical field inside the metal are greatly increased. The temporal profiles of the optical fields are predicted to exhibit pronounced subcycle oscillations which are attributed to the Bloch oscillations and formation of the Wannier-Stark ladder of electronic states. These effects are promising for applications as nanoplasmonic modulators and field-effect transistors with petahertz bandwidth.

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Vadym Apalkov
Georgia State University

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