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PHOTOCHROMISM IN SELENE-CONTAINING POLYOXOMETALLATES

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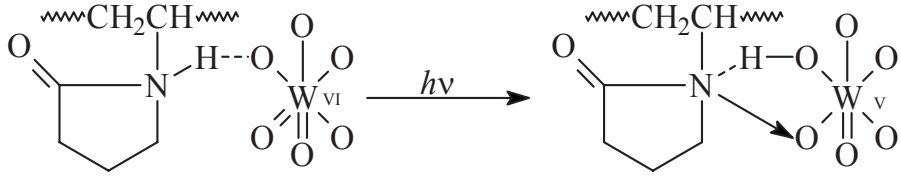
Photochromic materials are investigated in last years intensively in connection with prospect of their application in the means of optical holographic and not holographic treatment of information. The photochemistry of the polyoxometallates has been studied and described recently [1, 2].

Earlier we investigated organic-inorganic compositions on the basis of polyoxometallates (POMs) and poly(vinyl alcohol) (PVA), as media for record of the holograms having high resolving power (1000 line\mm), sensitivity 0,2 J/mm^2, but poor contrast. Thus, the search of new organic-inorganic compositions is of interest.

By means of IR, UV and ESR spectroscopy organic -inorganic compositions obtained on the basis of a polyvinylpyrrolidone (PVP) and $[Se_2W_{21}O_{69}]^{4-}$, $[Se_2W_{18}Cu_3O_{66}]^{12-}$, $[Se_2W_{19}Mo_2O_{69}]^{4-}$ at the all forms of them were investigated. For all investigated compositions the absorption in range 240 nm is characteristic, for the irradiated form - the maximum of absorption is removed (shifted) in range 580-700 nm. The IR spectra of the investigated compositions show four characteristic bands of polyoxometallates in the range of 700-1000 cm^{-1}: ν_{as} (W=O), 960 cm^{-1}; ν_{as} (W-O$_b$-W), 890-870 cm^{-1}; ν_{as}(W-O$_c$-W), 750-720 cm^{-1}; ν_{as} (Se-O) 830 cm^{-1} and characteristic bands of polyvinylpyrrolidone (the bands at about 2933-2852, 1687, 1592-1427, corresponding to ν_{C-H}, ν_{C-C}, ν_{C-O}, ν_{O-H}, respectively) and also presence of a new band of absorption at 3447 cm^{-1}, corresponding ν (N-H). Results show that polyoxometallates interact with polyvinylpyrrolidone. The composite films exhibit photochromic properties. When irradiated with UV light, the transparent films change from colorless, green or yellow to blue. The photochromism of the composite is due to charge transfer by reduction of polyoxometallates and oxidation of polyvinylpyrrolidone. The mechanism of interaction of polyoxometallates with a polyvinylpyrrolidone as the following photochemical reaction is offered.



References

[1] H.Y. Zhang, E.B. Wang. *Materials letters,* 57 **(2003)** 1417-1420.

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