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## ACCEPTED MANUSCRIPT

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# UV-induced formation of color centers in dispersed TiO<sub>2</sub> particles. Effect of thermal treatment, metal (*Al*) doping, and adsorption of molecules

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#### **Graphical abstract**



#### **Highlights**

- Aluminum-doped titanium dioxide, Al<sub>x</sub>Ti<sub>(1-x)</sub>O<sub>2</sub>, materials at different levels of Al doping are reported that were prepared by a solid-state synthesis.
- Aluminum doping of titania led to formation of *intrinsic* and *extrinsic* (Al in Ti positions) defects in the subsurface region and in the bulk lattice.
- Al doping of titania causes noticeable UV coloration of titania particles.
- UV-induced photocoloration of titania can delineate between the subsurface and lattice bulk areas in titania particles.

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