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Non-controlled impurities and their recharge in $LiNbO_3$:Rh[1] KAMRON HANSEN[2], VALENTIN GRACHEV, MARTIN MEYER, GALINA MALOVICHKO, Montana State University, PHYSICS DEPARTMENT TEAM — Rapid developments in material science and nanotechnology have made it necessary to develop advanced materials for optical applications. Rhodium doped lithium niobate is a candidate for use in photorefractive applications and holographic data storage. Basic knowledge about the defects and their structures within this material are necessary to improve crystals for these applications. Magnetic resonance techniques combined with optical spectroscopy are powerful tools to investigate paramagnetic impurities and determine their characteristics. EPR provides information on charge states, symmetries and positions of the defects in the crystal lattice. Optical absorption spectroscopy allows us to establish optical absorption bands within the visible region of the electromagnetic spectrum. It was found that rhodium doping facilitates an entering of additional non-controlled impurities: Fe^{3+}, Mn^{2+}, Cu^{2+} and Co^{3+}. Several Rh^{4+} centers have also identified. The recharge of Rh^{4+} to Rh^{5+} and accompanying recharge of Fe^{3+} to Fe^{2+} were confirmed with measurements of optical absorption changes under pump light illumination.

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