Huneke-Wiegand Conjecture and Change of Rings

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Let $R$ be a Cohen-Macaulay local ring of dimension one with a canonical module $K_R$. Let $I$ be a faithful ideal of $R$. We explore the problem of when $I \otimes_R I^\vee$ torsionfree, where $I^\vee = \text{Hom}_R(I, K_R)$. We prove that if $R$ has multiplicity at most 6, then $I$ is isomorphic to $R$ or $K_R$ as an $R$-module, once $I \otimes_R I^\vee$ is torsionfree. This result is applied to monomial ideals of numerical semigroup rings. A higher dimensional assertion is also discussed.

This is a joint work with Ryo Takahashi, Naoki Tanogucht, and Hoang Le Truong.